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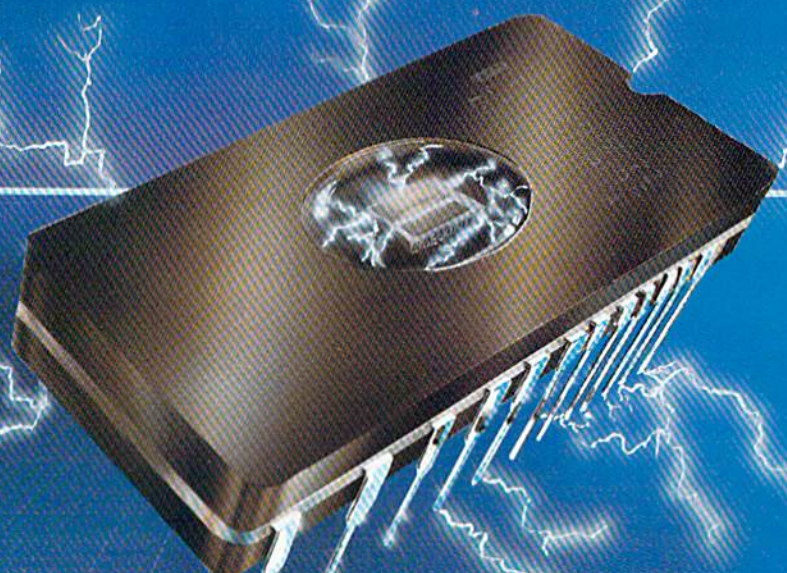

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On-field Football (GAMESTAR)	?	159 sec	66 sec	63 sec	56 sec
EASY FINANCE I (COMMODORE)	?	58 sec	13 sec	13 sec	11 sec

* = Will not fast load — defaulted back to regular load.
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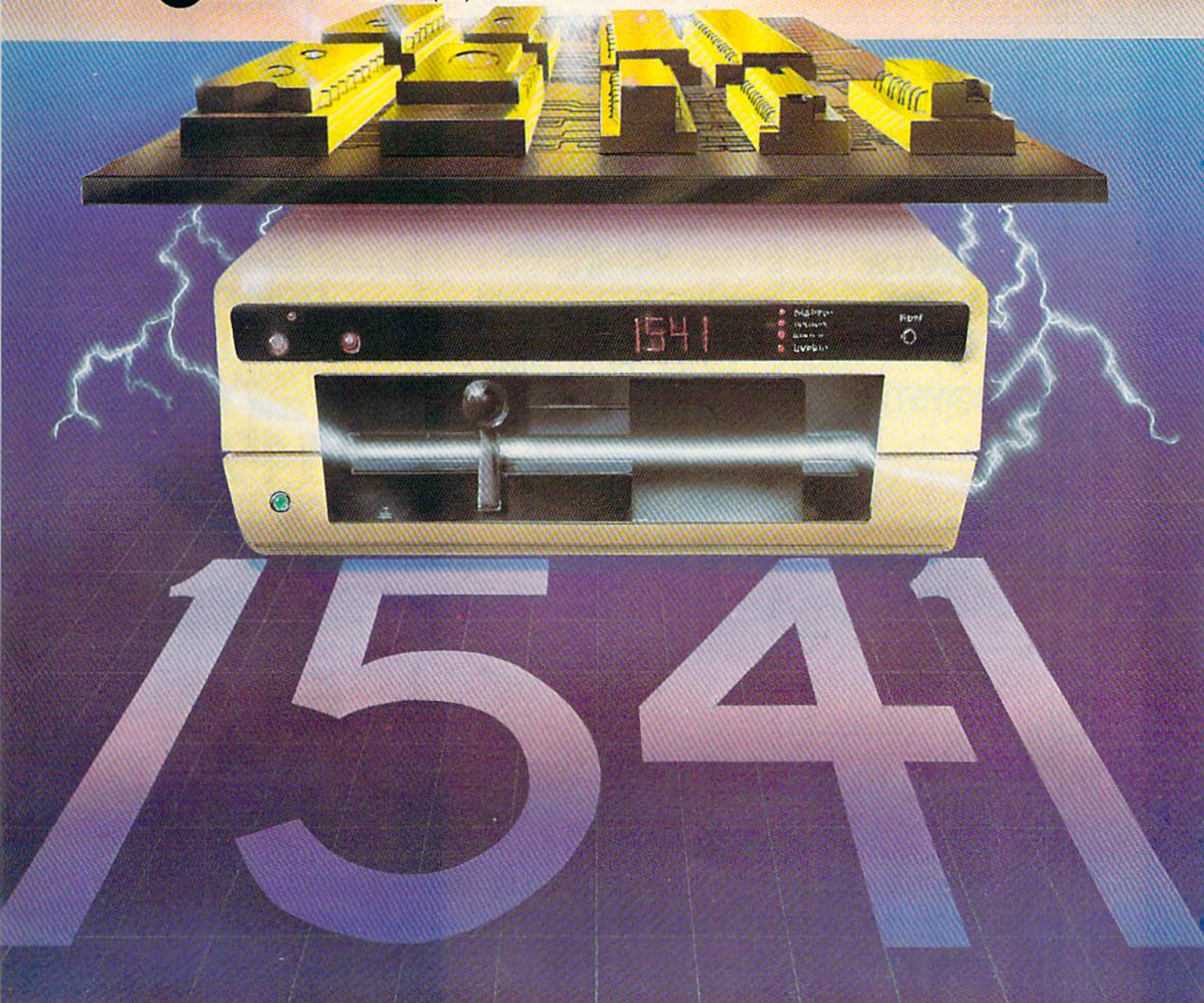

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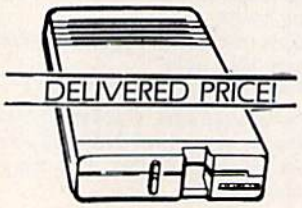

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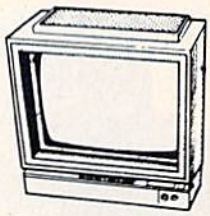

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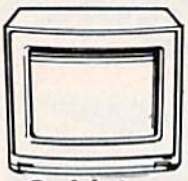

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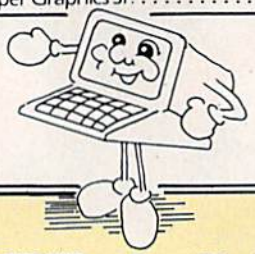

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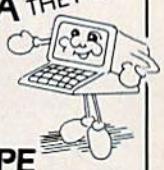

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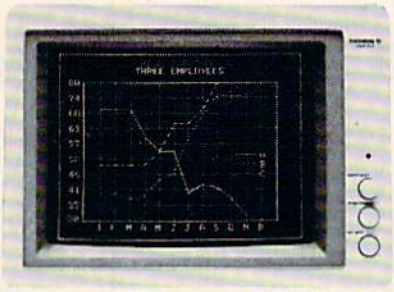

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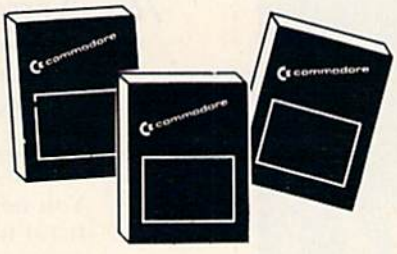

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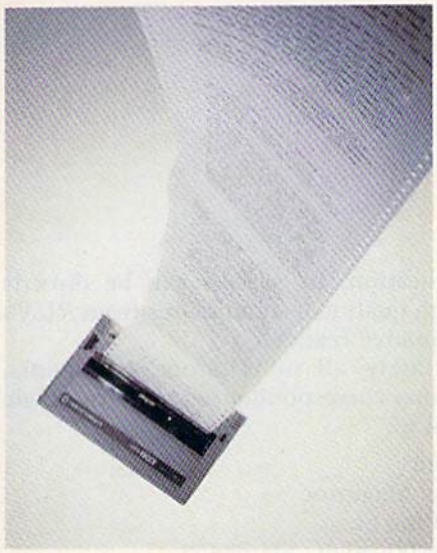

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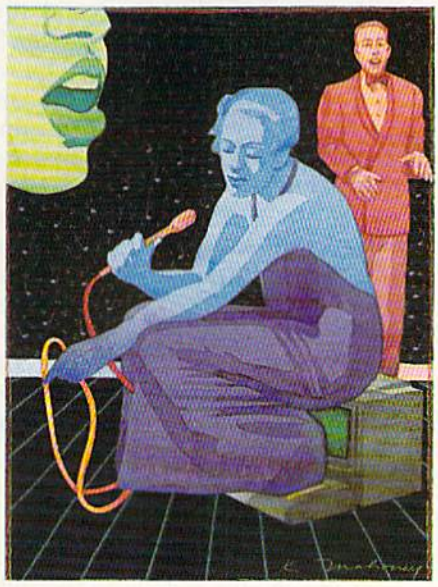

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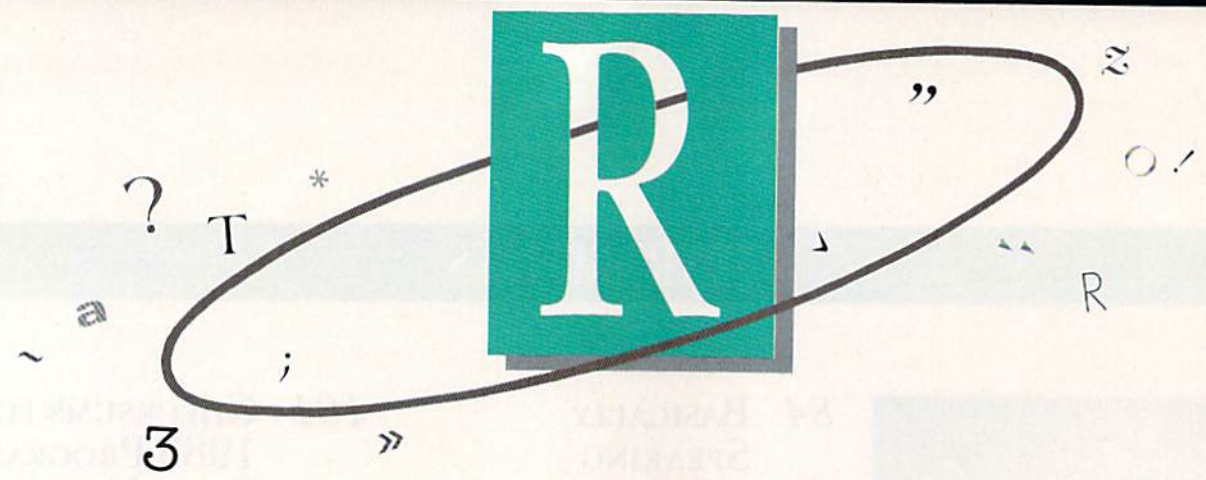

Policy on Published Programs

User's group presidents and program directors across the country are grappling with the problem of formulating club policy regarding the club's use of programs published in computer magazines. I've responded to many such inquiries about *RUN*'s policy. With each letter I receive, I'm encouraged that users are concerned about adhering to the copyright law in this matter.

The law is specific: Copyrighted programs in magazines are protected from unauthorized copying and distribution, unlike public domain programs, which anyone may copy and distribute. While the policy regarding the use of published programs may vary from magazine to magazine, all published programs are covered by this copyright law.

Confusion arises when magazines decide not to protect their copyright. For example, one computer magazine states that their programs "are in the public domain; free to copy (give away), not to sell."

I'd like to clear up a couple of misconceptions about *RUN*'s policy:

1. When a published program is manually typed into an individual's computer, it does not enter the public domain and cannot be reproduced with impunity.
2. Even if he or she receives no monetary consideration, a computerist may not legally distribute that typed-in program to others.

Simply put, *RUN*'s policy is to retain our copyright to the programs we publish; they are for the personal use of the reader and may not be copied and distributed.

As a service to its readers, *RUN* offers its published programs on disk in ReRUN. We hope that you will avail yourselves of this service, rather than seek out software libraries which may illegally make *RUN* programs available.

Magic Moves

According to reader surveys, the Magic column is certainly one of the most-read features of *RUN*; it has become, perhaps, one of the most popular columns in any computer publication. Its success can be directly attributed to the high quality of submissions from *RUN*'s inventive and imaginative readers.

Effective immediately, all submissions, comments, questions and any other correspondence regarding Magic should be addressed to:

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Other Commodore-specific publications have tried to duplicate the success of Magic, but the number and usefulness of the tricks published in Magic cannot be matched.

RUN devotes more pages each issue to reader-submitted hints and tips than any other magazine. Moreover, both last year and this, *RUN* has produced a special issue containing over 500 Magic tricks.

Whether you're a beginning or advanced computerist, you'll find information you can use in this tightly packed column. The value of Magic lies mainly in its immediacy. The programs are short, so you can quickly type them in and see the results.

The Magic column has been responsible for giving new life to the C-64 and for introducing thousands of readers to the features of the C-128.

If you are a first-time reader of *RUN* (and this month *RUN* welcomes over 68,000 new readers), be sure to turn to the Magic column—the original column of reader-submitted hints and tips for Commodore users—and enter the "magical" world of Commodore computing. **db**

New Bulletin Board Number

The *RUN* technical and editorial offices have recently changed locations, necessitating new phone lines and a new phone number for the RUNning Board. We invite you to give us a call at the new number, 603-924-9704, to find out the latest information about *RUN* magazine and the Commodore industry.

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MAGIC

Compiled by LOUIS F. SANDER

MAGIC is tricks, MAGIC is fun. MAGIC is doing what cannot be done.

Every month, Magic brings you brief and useful computer tricks from around the world—tricks to make computing easier, more enjoyable or more exciting. We number our tricks in hex, the counting system of sorcerers and computerists.

Magic solicits your simple hardware ideas, short programs, useful programming techniques, little-known computer facts and similar items of interest. We look for new or recycled material that can be implemented with a minimum of time, effort or theoretical knowledge and that is of current value to Commodore computerists (Plus/4 and C-16 owners, too). RUN *will pay up to $50 for each trick accepted. Send your tricks to:*

MAGIC
RUN Magazine
80 Pine St.
Peterborough, NH 03458

If you enclose a self-addressed stamped envelope, we'll send you a Trick Writer's Guide. Readers outside the United States may omit the stamp.

Welcome once again to Magic. Our April alchemy includes an Easter Bunny game, a joke for April Foolers and a delicious diversity of daringly dazzling delights. Your fellow readers have sent their best work to us, in hopes that it will be helpful to you. So, enjoy your friends' enhancements, applaud your fellows' amusements and use your colleagues' utilities. If there's a good trick up your own sleeve, write it down and send it in.

$2CC Star SG-10 special mode—This popular printer has an undocumented mode in which it prints everything sent to it as hex digits, much like a machine language monitor. The mode is useful in debugging faulty print routines, since it lets you see exactly what the printer is receiving, control sequences and all.

To activate the Hex mode, turn your printer off, then press both the formfeed (FF) and linefeed (LF) buttons. Turn the power on, keeping these buttons pressed until the printer's beeper sounds. Release the buttons, and your printer will be in Hex mode until it is either re-initialized or powered down.

James Judd
Ballwin, MO

$2CD Modem cable tip—I used to connect my modem by disconnecting the telephone handset cable at the handset, then plugging it into the modem. It was always hard to get to the modem, which was out of the way behind my computer. To make things easier, I bought a coiled handset cord, which I now leave permanently connected to my modem. When the time comes to connect, I unplug the handset from the phone base, then plug in my new modem cord. The phone is more mobile and accessible than the modem.

Michael T. Martin
Phoenix, AZ

$2CE Modem modification—Some bulletin board systems are very difficult to connect to, since they have far more callers than available lines. Many terminal programs, when they encounter a busy signal, will keep redialing until they get through. This is great, but usually you, the operator, must keep your eye on things so you know when the connection has been made.

You can free yourself for other tasks if you wire a switch and a small piezoelectric buzzer (Radio Shack #273-060) across the modem's carrier-detect LED. Close the switch before dialing, and when the LED finally goes on, your buzzer will start to buzz. Stop the noise by opening the switch, and proceed with your telecommunicating.

C. A. F.
Throop, PA

$2CF 300-baud speedup—If you don't have a 1200-baud modem, here's a little consolation. It doesn't work with all modems or all terminal software, but when it does, it increases your modem speed to 345 baud, a 15 percent increase. (At these slow speeds, every little bit counts!) The trick is to add this line to your terminal program after the modem's Open statement:

```
POKE 665,240 : POKE 666,11
```

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Model CP290

THE X-10 POWERHOUSE INTERFACES WITH YOUR COMMODORE TO CONTROL YOUR HOME...FOR SECURITY, COMFORT AND ENERGY SAVINGS.

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THE WAY IT WORKS. The X-10 Powerhouse Interface is cable-connected to the Commodore "User" port and plugged into a standard 110V outlet. After it is programmed, the Interface sends digitally encoded signals through your home wiring to special X-10 Modules. To control a lamp or appliance, you simply plug the electrical device into a Module

and then plug the Module into an outlet. The Interface can control up to 256 Modules throughout your home and won't interfere with normal use of lights and appliances.

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Circle 77 on Reader Service card.

The terminal program, of course, has to be written in Basic.

Greg Long
Hillsboro, OR

$2D0 Flight Simulator II coordinates—The manual omits the coordinates for some important landmarks:

World Trade Center—17060 N, 20982 E
Brooklyn Bridge—17054 N, 20991 E
Empire State Building—17073 N, 20991 E
Statue of Liberty—17049 N, 20971 E

When entering coordinates from the Editor mode, don't start out on the landmark itself, or you'll fall to the street like King Kong.

Kim Moser
New York, NY

$2D1 Flight Simulator II jet assist—In the Editor mode, if you type 65535 for your throttle setting, you can cruise at 189 knots and climb at 1600 feet per minute. Also, if you select the right fuel tank prior to entering WWI Ace mode, your effective range is doubled.

Nicholas R. Clarke
McKinnon, Victoria
Australia

$2D2 Sky Travel on the bias—In this popular program, you can move diagonally by using the @ sign, asterisk, semicolon and equals-sign keys. It greatly speeds up getting to different items in the sky.

Roy Liesegang
Randolph, NJ

$2D3 Calc Result easy save—Contrary to what the manual implies, you can use the Save with Replace command in this program. When asked for a filename, type "@0:filename". The @ will show up as a hyphen, but the file on the disk will be replaced by the one you're now saving.

Lowell Unger
Wynyard, Saskatchewan
Canada

$2D4 Selecting sheet music—Commodore computers have a great deal of musical talent, but they are limited to three voices (four for the Amiga), or, in other words, to three notes playing at once. Unfortunately, most sheet music is arranged for the keyboard world, where up to ten notes can be playing at once (one for each finger), and where a huge double staff is used. When you computerize such music, choosing the three most important notes can drive you back to spreadsheets.

If you want to make life easier, buy your sheet music in the finger-picking guitar department of a well-stocked music store. Most finger-picking guitar arrangements are in a three-voice format, with all voices noted on one staff. The finger-picking style puts a complete lead, harmony and bass arrangement on a single instrument and is tailor-made for Commodore computers.

Dave Rensberger
Brea, CA

$2D5 Bunny Hop—This game for the C-64 or C-128 in 64 mode lets you put the Easter Bunny into his basket. To make him hop, hold down any key for a second or so. The longer you hold it, the farther Mr. Rabbit jumps. If he misses the basket, he returns to his starting place and lets you try again. When you put him into the basket, the program tells you how many hops it took.

You can make the game more difficult by increasing the value of X in line 35. That moves the starting point closer to the basket, making the target harder to hit.

```
10 PRINT"{CTRL 8}{SHFT CLR}{CTRL 1} MAGIC B
   UNNY HOP - BOB & DAVE SNADER{CRSR DN}"
15 H=1:V=53248:POKE2Ø4Ø,13:POKE18Ø5,76:POKE
   18Ø8,122
2Ø FORJ=832TO879:READK:POKEJ,K:NEXT
25 FORJ=88ØTO896:POKEJ,Ø:NEXT
3Ø POKEV+21,1:POKEV+33,5:POKEV+39,1
35 X=5Ø:Y=192:F=Ø:G=Ø:POKEV,X:POKEV+1,Y
4Ø IFPEEK(197)=64THENGOTO4Ø
45 IFPEEK(197)<>64THENF=F+.Ø4:GOTO45
5Ø POKE198,Ø:POKEV,X:X=X+F:POKEV+1,Y
55 Y=Y-1.5*F+G:G=G+.Ø5:IFY<ØTHENY=Ø
6Ø IFY<192ANDX<255THENGOTO5Ø
65 IFX>195ANDX<212THENPRINT" YOU DID IT IN"
   ;H;"HOPS":END
7Ø FORJ=ØTO7ØØ:NEXT:H=H+1:GOTO35
71 DATA ØØ8,ØØØ,ØØØ,Ø12,ØØØ,ØØØ,Ø14,Ø24
72 DATA ØØØ,ØØ7,Ø6Ø,ØØØ,ØØ1,Ø66,ØØØ,ØØØ
73 DATA 224,ØØØ,ØØØ,248,ØØØ,ØØØ,24Ø,ØØØ
74 DATA ØØ3,128,ØØØ,ØØ7,128,ØØØ,Ø15,128
75 DATA ØØØ,Ø31,224,ØØØ,Ø31,Ø32,ØØØ,127
76 DATA ØØØ,ØØØ,126,ØØØ,ØØØ,Ø31,24Ø,ØØØ
```

Bob Snader and David Snader
Baltimore, MD

$2D6 April 1 Magic—If you appreciate practical jokes, you'll have endless fun with these April Fools subroutines. The first one simulates the Ready prompt, leading one to believe that the main Basic program is finished. However, nothing could be further from the truth.

The first subroutine is composed of lines 699–750. These give the bogus Ready prompt, which, for the next 30 seconds, waits for you to press any key. If you do, an interesting message appears on the screen, and the 30-second timer is reset. If no key is pressed, the subroutine finishes so quietly that nobody is the wiser.

To get the second subroutine, replace lines 740 and 750 with lines 770 and 780. This time, the subroutine also waits 30 seconds. If a key is pressed during this period, the subroutine terminates unobtrusively, and your computer will accept normal keyboard input. But if the Magic key defined in line 700 is pressed, program execution is transferred to line 780. You can put anything at all there, including hundreds of additional program lines.

As printed, the program runs on the C-64 or VIC-20.

Continued on p. 96.

Circle 93 on Reader Service card.

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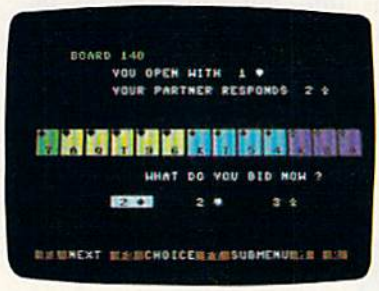

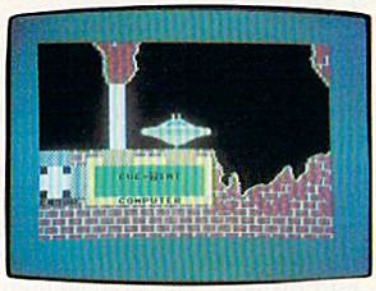

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Compiled by SUSAN TANONA

The Management Edge

B

This Program Will Help You Sharpen Your Management Skills

The people at Info Designs take their software seriously. This company, which already has a line of good business software for the C-64, has gone one step further with the release of "The Edge" series of programs. There are four packages available: Sales, Communication, Negotiation and Management. Operation of all four packages is quite similar. I'll focus on The Management Edge program.

The techniques that these programs use actually border on artificial intelligence. By answering a series of questions about your own likes and dislikes, The Management Edge analyzes and categorizes your management technique.

You need only answer the questions about yourself once. You can then begin to develop management strategies for one or more of your employees.

In the next step, you are asked to respond to a series of adjectives that might describe the employee. Either you feel the adjective accurately describes the employee or you don't, and you respond accordingly.

Once the survey is complete, you can receive a management-strategy report. It can be directed either to the screen or to a printer.

The main program resides on one disk; a second disk contains a variety of text files that are used to assemble the report.

Your own style and that of the employee generate internal codes within the program. The report is assembled from these codes.

Because the report is assembled from text files contained on disk, it takes about 20 minutes to generate a report. This is due to the excruciatingly slow speed of the 1541 disk drive. Disk access is necessary because the text in the program eats up a lot of memory and it's simply not feasible to load all possible combinations into the computer at the same time.

Report Card

A ***Superb!*** An exceptional program that outshines all others.

B ***Very Good.*** One of the better programs available in its category. A worthy addition to your software library.

C ***Good.*** Lives up to its billing. No hassles, headaches or disappointments here.

D ***Mediocre.*** There are some problems with this program. There are better on the market.

E ***Poor.*** Substandard, with many problems. Should be deepsixed!

While Info Designs should not be held accountable for this inherent limitation in Commodore's equipment, you should be aware of such delays. The first time I ran the program, I thought something might be wrong with it.

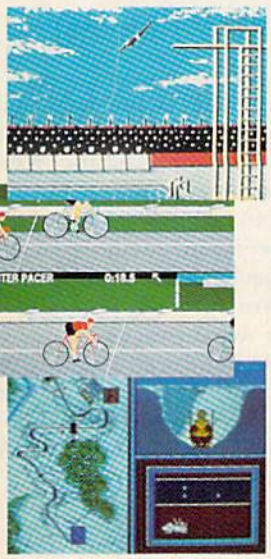
The report that The Management Edge generates is several pages long. When sent to the printer, it is formatted for 80 columns. Page numbers are generated and form feeds keep the report from printing on the paper's perforations. Only Commodore-type printers are supported by the program.

A typical report includes suggestions on how to motivate the employee according to his or her own personality, suggested disciplinary measures (when necessary) and even how to fire a worker. The report also points out your flaws and weaknesses in your dealings with people.

I also took a look at The Negotiation Edge. Its operation is virtually identical to The Management Edge. The focus, however, is on items important to negotiation rather than management. The report generated is quite impressive. It gives you a master plan that you can take with you into your next meeting. You should find the other programs in the series equally helpful in organizing your business strategies.

You may not always agree with the suggestions made by these programs. All such evaluations are based on one person's idea of good management, negotiation, sales or communication. While the questionnaires use a large enough base to have a reasonable chance of being accurate, it is impossi-

22 FAST-PACED, EXCITING EVENTS. GO FOR THE GOLD!



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Winter Games	✓	✓		✓	✓	✓

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ble to identify correctly every possible personality in such a short time.

If you think of these programs as tools, much like seeking the advice of someone you trust, they will serve you well. Simply remember that you don't always take the advice offered by others.

Info Designs is to be congratulated for offering these innovative applications for the Commodore 64. *(Info Designs, 445 Enterprise Court, Bloomfield Hills, MI 48013. C-64/$79.95 disk.)*

Jim Grubbs
Springfield, IL

Newsroom

Design and Print Out Professional-Quality Newsletters

The program developers at Springboard have created a software package that makes desktop publishing on inexpensive personal computers a reality. The Commodore 64 version of Newsroom was recently released.

The C-64 version of Newsroom will not give you the versatility and quality available from the Amiga or Macintosh. It will, however, allow you to create, one page at a time, newsletters that will be professional in appearance.

You start the creation of your newsletter by selecting one of several work areas available from the main menu. You may choose to develop a banner, create photos, input copy, transfer partial or entire newsletters via modem, lay out a page or print your creation.

The Banner option allows you to create an individual identity for your publication. Hundreds of pieces of artwork are available to help you customize the banner. A versatile graphics area, similar to the kind used in KoalaPainter and Doodle, allows you to create your own designs. It includes five type styles so that you can add words and numbers directly to your pictures.

Most of the graphics included with Newsroom are somewhat whimsical, making them especially attractive to student editors. Future additions to the graphics library promise more business-oriented art for us older children.

In the photo-lab work area, you can create customized pictures. You can make the pictures as small as you like, or large enough to fill an entire panel. A typical newsletter includes a banner across the top and a total of six panels.

The Copy Desk option is a complete word processing system for entering text. You can place photos before entering copy, so that you can set up text around the pictures. Several type styles are available in both small and large sizes.

Each page is broken into individual panels. So, if your article is going to take up more space than one panel allows, you'll really have to plan the layout of your page ahead of time. The end result looks smooth and professional, even though you may have to resort to breaking text between panels.

The banner and all the panels are stored individually on disk, so you may call them up in any order. Once created, you place them in final form by using the layout work area. Regardless of how you originally created them, you can arrange panels in any order in the final layout.

You'll find that it takes some time for your final product to be printed, and you'll have to switch disks several times during the process. However, full screen prompting makes the task quite simple.

The Wire Service option of Newsroom is one of its most impressive features. Selecting this feature places you in a highly specialized telecommunications program. If you have a modem, you can transmit anything created with Newsroom to another modem-equipped computer. Because of Springboard's unique coding system, any files created with Newsroom can be exchanged without regard to the brand of computer at each end. Both machines, however, must use the special software included in Newsroom.

For students and schools with a variety of computers, this feature goes a long way toward uniting the editorial team. It's an idea whose time has finally come.

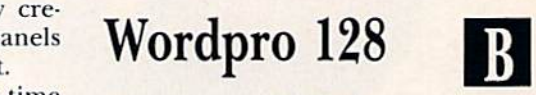
The instruction booklet for Newsroom is 86 pages long. Overall, it is thorough and well-written. The on-screen instructions make it easy to navigate, although I would like to have seen more specific examples. It took me several hours to create enough material to finally get to the printing stage of production. Sample panels would allow you to experiment with all the features of the program without having to do so much initial work.

You can purchase separately an auxiliary disk containing another 600 pieces of clip art, which are a bit more serious than the art included with the program itself. Springboard will issue additional collections from time to time.

Newsroom has taken up an honored position in my software collection. I've already used it to plan several sales brochures. It's sure to please all ages of Commodore computerists. *(Springboard, 7808 Creekridge Circle, Minneapolis, MN 55435. C-64/$49.95 disk.)*

Jim Grubbs
Springfield, IL

Wordpro 128



Tap Your C-128's Potential with This Powerful Word Processor

Wordpro 128 is the first of a new generation of word processing software from Pro-Line. Written by Commodore programmer Steve Punter to take advantage of the increased speed and memory of the C-128, this package is an expanded version of Wordpro 64. It is also a major league word processor.

If you've long endured working on a 40-column screen, you'll really appreciate the convenience of 80 columns. Text occupies the entire width of the screen, and words that can't fit at the end of a line are automatically wrapped to the next line. You can preview documents up to 80 columns wide on the screen exactly as

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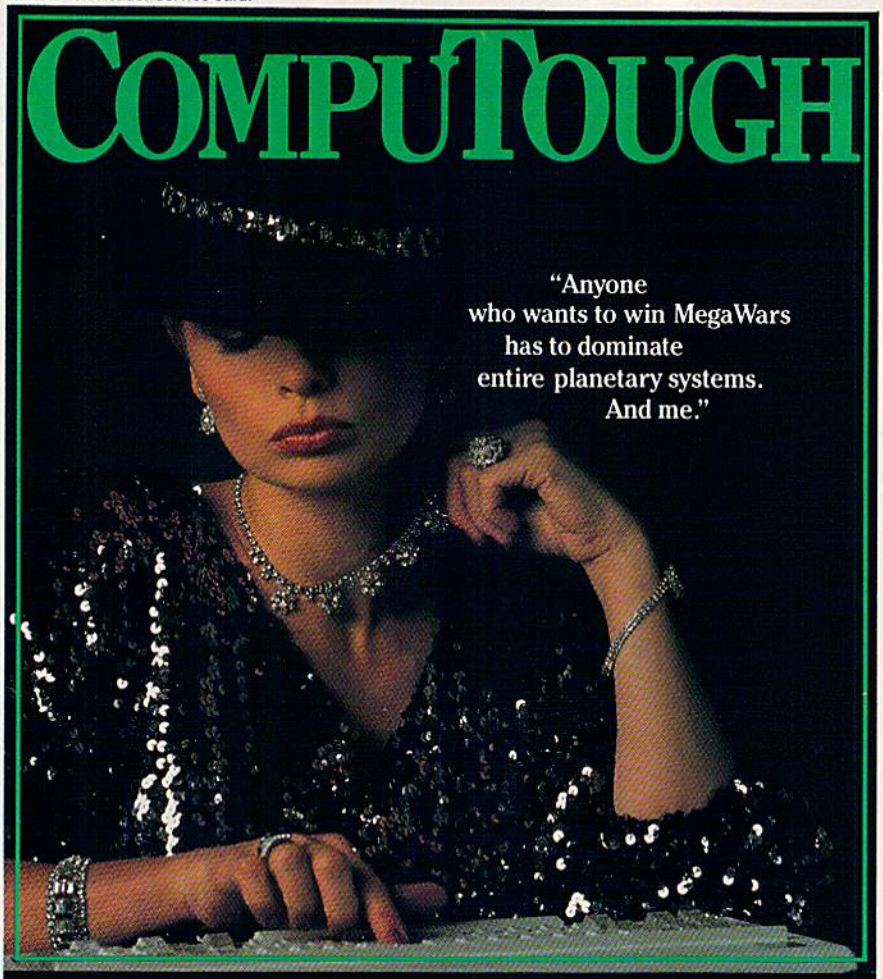
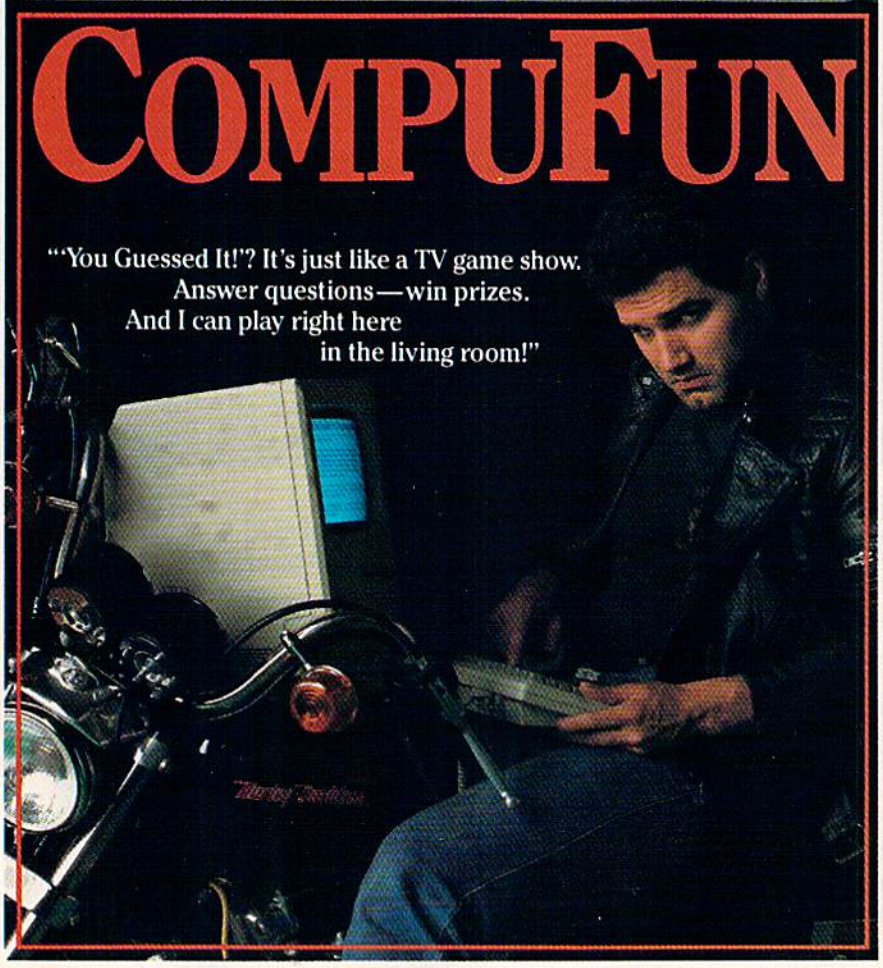



COMPUFUN
"'You Guessed It!'? It's just like a TV game show.
Answer questions—win prizes.
And I can play right here
in the living room!"

they will be printed, and a side-scrolling feature allows you to preview wider formats.

Despite its heritage, Wordpro 128 isn't merely a rewrite, as it also offers many new features.

With almost 36K devoted to memory, Wordpro 128 can hold documents two-and-one-half times larger than its predecessor. Other new features include the ability to embed non-printing comments within text and the addition of a Pause command to stop a printout.

Of course, Wordpro 128 has all the features that made Wordpro 64 so popular—printer modules that support proportional printing, double-column output, alternating page formats to allow double-sided printing and binding, and the ability to design and print custom characters.

It also has all the standard word processing features, such as headers, footers, variables, form letters and block deletions. In addition, Wordpro 128 can read documents created with previous Wordpro software, as well as any sequential text files.

A welcome feature is the temporary holding area for deleted text. When not holding deletions, you can use this buffer to hold the disk directory in memory to speed up file recall and storage.

A simple keystroke switches you into the Extra Text mode, where you can work on another document, refer to a previously stored outline or transfer text from one document to another. It's almost like having two word processors in one.

In an effort to continue to support 40-column screens, Pro-Line is shipping Wordpro 128 disks with an enhanced version of Wordpro 64 on the back. This version must be run in C-64 mode, and, as a result, Wordpro 128's strongest features are unavailable. A real 40-column version is now in preparation.

The copy-protection scheme is annoying, to say the least. If you are running Wordpro 128 on a 1541 drive, you'll experience the familiar sound of the drive's head battering itself against the stop. This is a result of the compromise necessary to publish protected software that will run on the 1571 as well as on existing drives.

The only feature I found lacking is one that would allow you to move the cursor from word to word or to the beginning of a sentence with a single keystroke, eliminating the relative slowness and imprecision of jockeying the cursor keys.

I was also disappointed to discover that the disk-directory buffer shares space with the Delete function. This was a compromise in Wordpro 64 that was necessary because of the C-64's limited memory.

Blemishes and bugs notwithstanding, Wordpro 128 is a high-quality package. It's fast, easy to learn, full-featured and well-documented. If you liked Wordpro 64, you're going to love Wordpro 128. *(Pro-Line Software, 755 The Queensway East, Unit 8, Mississauga, Ontario, Canada L4Y 4C5. C-128/$99.95 disk.)*

John Premack
Lexington, MA

Modify Budget Amounts
Use command keys shown below
Modify Budget Amounts
for the month of January
Category Budget Actual $Dif %Dif
Income 25000 0 -25000 0
Loans 2000 0 2000 0
Taxes 455 0 455 0
Groceries 240 0 240 0
Residence 425 0 425 0
Utilities 110 0 110 0
Clothing 55 0 55 0
Transp. 218 0 218 0
Insurance 0 0 0 0
Recreation 0 0 0 0
Med/Dent 0 0 0 0
Education 0 0 0 0
Misc. 0 0 0 0
Other 0 0 0 0
Tot. Expenses 3503 0 3503 N/A
Net Income 21497 0 -21497

Your Personal Financial Planner.

Sylvia Porter's Your Personal Financial Planner

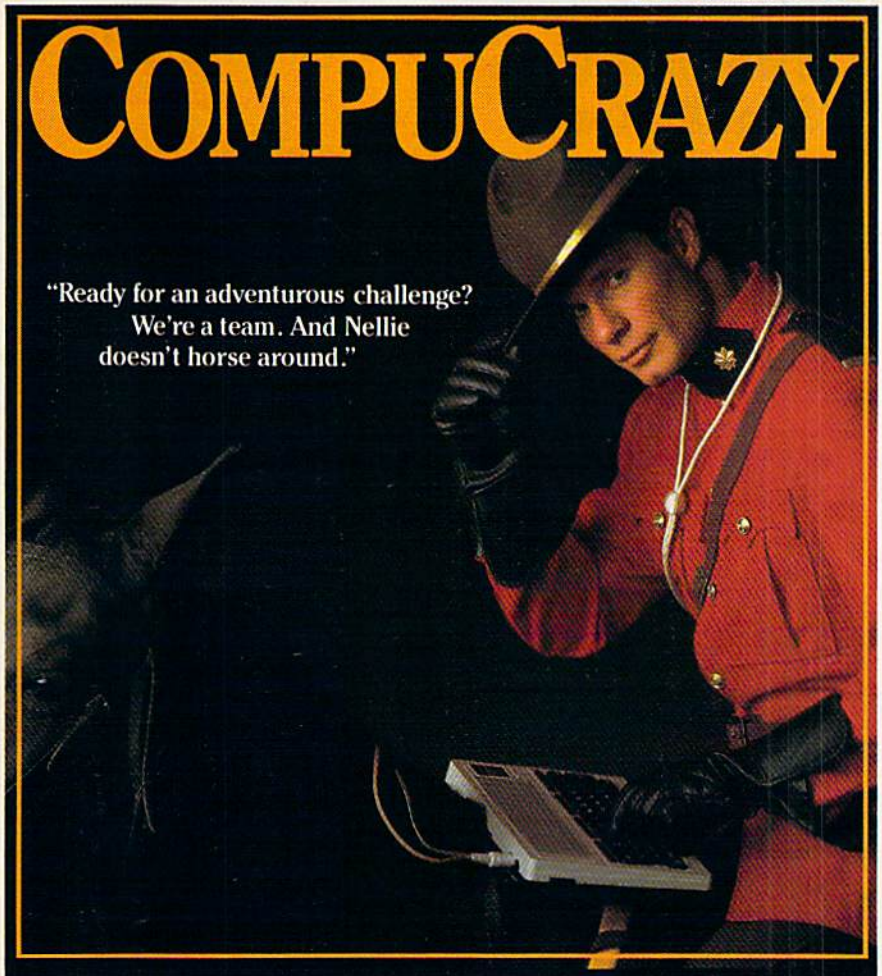
A

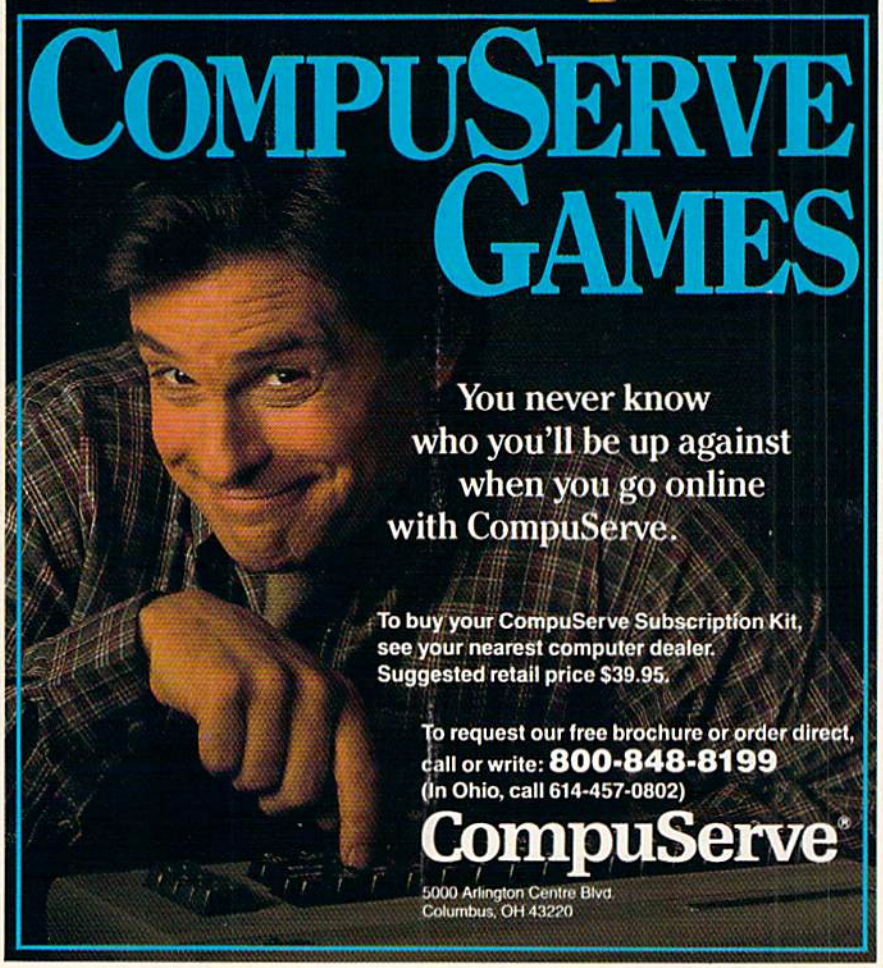
Let Financial Wizard Sylvia Porter Help You Manage Your Money

Sylvia Porter's Your Personal Financial Planner, the first volume in Timeworks' Sylvia Porter's Personal Finance Series, is a class act from start to finish.

This program for the C-64 (a C-128 version is also available) accomplishes the tasks you would expect a home money manager to do, such as

Circle 64 on Reader Service card.

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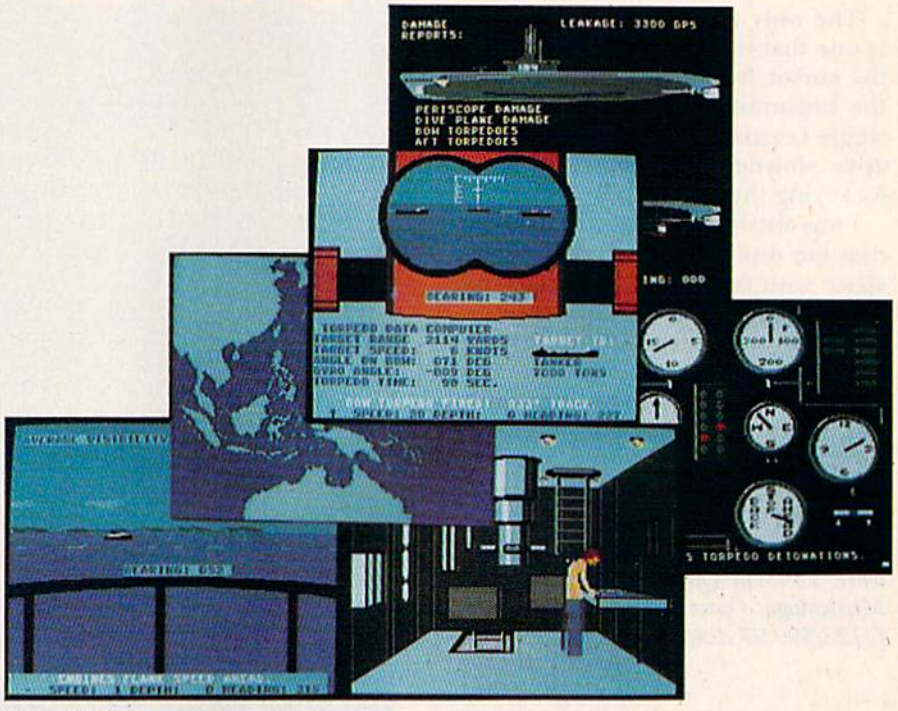

Silent Service.

balancing up to five bank accounts, keeping track of ten credit cards, helping you budget your money, and much more. The program gives you database power to manipulate transaction records and spreadsheet functions to do financial planning. If you need money-management software to handle your finances, Your Personal Financial Planner should suit your needs.

Be aware that, like any major application, this program is complex. Although its excellent documentation and handsome screens (which feature pull-down menus) make it easy to use, you'll still have to invest some time to learn all its functions. This program suffers somewhat from the 1541's slow speed; data entry is quite time consuming, because you enter information in relative files, with frequent disk access. Also, you must swap between four program disks and three data disks.

I simply don't have room to talk about all the nifty features of this program. Instead, I'll just discuss some of the special options.

I give the program's documentation several gold stars. Whether you're a novice or an old pro, it should meet your needs on most points. The manual is well-written, clear and generously illustrated. It has a nice index, a trouble-shooting guide and a quick-reference section that reviews procedures for every function in the program. Every screen includes a list of command keys. One thing I love about the program is that you can escape from any function at any time.

The program lets you search data on any record field, and you can use several transaction disks in the same search. This program compares well with a sophisticated database for ease of use and flexibility in manipulating data.

You can dump any data screen to the printer and save report formats for printing data collections. Printouts include income statements, balance sheets and insurance or stock summaries. You can also print out checks—the manual tells you where to buy appropriate forms. Incidentally, you can read data from the program into Timeworks' Word Writer word processing program.

You don't have to be an accountant to set up a chart of accounts. The program provides codes that will cover most personal needs; you can design your own as well. The default account numbers let you read transactions into the Budget, Asset and Liability, and Financial Planner sections without additional keystrokes.

The Financial Planner section gives

you the "what if" power of a spreadsheet. You can specify a goal amount and date, make a guess at inflation and average rate of return, and develop worksheets for projects such as sending your kids to college or buying a house. Worksheet summaries help you set priorities.

Your Personal Financial Planner can't increase your income. It could, however, help you make better use of the money you do earn. If your personal affairs are complex enough to need managing, you can't go wrong with this program. *(Timeworks, 444 Lake Cook Road, Deerfield, IL 60015. C-64/$59.95 disk.)*

Annette Hinshaw
Tulsa, OK

Silent Service

Command a World War II Submarine In the Pacific

The software company that took you soaring to new heights with such hits as F-15 Strike Eagle and Mig Alley Ace now brings you Silent Service, a WWII submarine simulation that allows you to patrol the dangerous enemy-controlled waters of the Pacific.

In Silent Service, your sub is controlled from several different battle stations, which you can select from a central conning tower. Each battle screen is an excellent graphics representation of some part of a submarine and provides you with access to information and functions that you'll need to command your sub to victory.

The map screen shows you the location of your sub as you patrol a 300- × 500-mile area of the western Pacific. When you sight enemy ships, you can zoom in to any one of four levels of detail. The most detailed display reveals a 5- × 8-mile area and shows your submarine, the location of enemy ships and the path of your torpedoes.

Once enemy ships approach close enough to be tracked on the map, you can use the periscope to spot the ships (if you're submerged to a depth of 44 feet or less). Or, if the sub is cruising the surface, you can climb up to the bridge and use the binoculars. Once a ship comes into range, the torpedo-data computer will list the target's distance in yards, its speed and the number of degrees you should lead the ship with your torpedoes to score a hit. You can also get a target identification on the ship.

To help keep you abreast of information vital to the submarine's operation, there is an instrument and gauge screen. Instruments include a battery-level gauge, indicator lights that show whether the batteries are being recharged or drained, a torpedo-ready indicator, a fuel-level indicator, a water-temperature gauge, a compass and a clock. Since many of the scenarios can last several days, you'll want to keep track of the time to plan nighttime maneuvers and predawn convoy attacks.

Finally, there is a damage-report screen, which displays both an external view of the sub and a cutaway internal view. This indicates damage to such parts as torpedo tubes, periscope, dive planes and fuel tanks. In addition, if your sub is taking on water, the amount of leakage (in gallons per second) is displayed.

In all, there are close to 30 keyboard commands that you can enter to control everything from the sub's direction, depth and speed, to various emergency procedures.

Although it seems like a lot to handle at first, the excitement and realism of this simulation force you to master the controls quickly and, as usual, MicroProse's superb tactical operations manual prepares you for anything. Realistic action coupled with outstanding graphics and sound make Silent Service as enjoyable as even the best flight simulator on the market. *(MicroProse, 120 Lakefront Drive, Hunt Valley, MD 21030. C-64/ $34.95 disk.)*

Bob Guerra
Charlestown, MA

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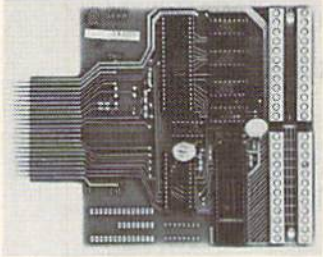

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A - 3

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ELECTRONIC ARTS™

HOME SWEET HOME CONTROL

Sleep those extra minutes while your C-64 brews your morning coffee. Leave for the weekend knowing your computer is standing guard. See how these two commercial packages can make your life more convenient.

By CHRISTINE and JOHN ADAMEC

Sure, it's fun to play video games with your C-64, but have you ever considered exercising some real control over your environment? Maybe you'd like to program your coffee pot to come on automatically at 7:30 AM, and then have it shut itself off at 8 o'clock. Or perhaps you'd like the lights to come on promptly at 6 PM, and go off again at 11 o'clock. And, while you're off visiting Uncle Henry and Aunt Em in Kansas, you might like to have a computerized security system stand guard—another interesting and practical application.

All this can happen today with either the X-10 Powerhouse, from X-10, or the Home Control System, by Genesis Computer Corp.

X-10 Powerhouse

The X-10 Powerhouse is composed of a control unit with its own built-in microcomputer, a cable for hookup to your C-64 and the software you'll need to operate it all. (Also included, of course, are the manuals you'll need to learn how to use everything.)

You'll also need plug-in modules, which allow your system to control appliances or lights throughout your house. The modules cost about $15 each, and you can buy them at Sears, Radio Shack or a major department store; or you can contact X-10 (201-784-9700). More complex devices, such as the thermostat module, are also available for about $50, but I'll just describe what we actually tested.

The modules are small, box-like devices that allow your computer/controller—by a combination of electronic and remote-control means—to transmit commands and control your appliances or lights without any rewiring of your home.

You don't have to be an electronics genius to hook up Powerhouse. Simply plug the modules into your wall sockets and then plug the appliance or light cord into the module. A child could do it!

Load the software and you'll be asked whether you want the Install or Operate mode. To set up, you need to start with Install. A clock was displayed on the screen and we were asked if it showed the correct time; if not, we could change it.

We were also asked if the "house code" was set at "A," meaning whether all our modules were set at the letter A when we identified locations. (There is a range of A1–A16; if you have more than 16 modules in your home, you can start using the letter B. Letters up to P are available, making for 256 possible combinations.)

Next, we moved to the program's colorful menu of rooms. These include a children's room, master bedroom, guest room, dining room, living room, kitchen, front of house, back of house and spare room. If you have more than one child's bedroom, you can use the spare room or guest room graphic to represent each of the other bedrooms.

We decided to start with the dining room. Moving the

Photograph by Edward Judice

X-10 Powerhouse.

joystick (you can also use the keyboard), we positioned the on-screen arrow to the site (out of 11 possible locations in the dining room) where we wanted to place our module. We chose the overhead lamp position, and the computer asked if this was a lamp or an appliance.

The computer told us that this module would be named A1. (We also could change this number.) Next, we physically checked to make sure that particular module was set at A1.

Now we "walked" out the door, using the joystick to move from room to room. We decided the living room TV would be assigned A2, and the living room floor lamp A3. (And, of course, we set the modules to the appropriate corresponding codes.)

Next, we needed to program how and when we'd want events to occur. So we moved to the Operate mode, and received the House menu of all the rooms again. Returning to the dining room (which now displayed a colorful Tiffany lamp with the code of A1), the computer asked us if we'd like that light on full or dim, and at what level of intensity (from 10–90%). The Powerhouse can also be programmed to shut itself down on given days—maybe you need it only during the week, or only on weekends.

On which days and at what time did we want the light on? We selected daily and at 6 PM. Next, we went through these same routines with our other two modules.

What did we think of the X-10? Very impressive! We especially liked the ease of operation and the way the software walked us through the entire process.

Two of the manuals are clear and helpful, going as far as warning you to be alert: "If an electric heater is turned on by remote control while clothing just happens to be draped over it, a fire could result."

But the third programming manual included with the package is more difficult to understand. One of us, an engineer, found this manual fascinating; the other found it baffling. Still, you can easily operate the system without ever using this manual.

We also liked the fact that the controller continues to run independently even when the computer is turned off after set-up. This is because the controller is actually a computer itself, powered by the wall outlet, with a nine-volt battery for a backup. And since the controller uses only the computer's expansion port, the cartridge port remains free. Thus, we could still play Frogger, an old favorite.

But the real proof is in action—did the system work? Yes, the lights clicked on promptly at 6 PM, whether or not we had the computer's power turned on. In fact, we were so pleased with the X-10 Powerhouse that we used it as a security system while we were away for several days.

Energy saving is another important application. If you've told your children about 900 times to turn off their bedroom lights in the daytime, you'll really appreciate using this time-driven option.

The system is very easy to operate and understand. However, all events on the X-10 are time-controlled; unlike Genesis' Home Control System (described in the next section), you can't program the computer to react to outside sensors.

Any areas of improvement for the Powerhouse system? We do have one suggestion for the manufacturer: Combine the three manuals into one. We didn't like flipping back and forth between manuals, and would prefer that everything were included in one comprehensive book, with the more complicated material at the end.

The X-10 interface, software and connecting cable are available for $70. Appliance and light modules cost about $15 each; modules that perform other functions are available for up to $50 each. X-10, 185A Legrand Ave., Northvale, NJ 07647.

Home Control System

The Home Control System, from Genesis Computer Corp., consists of the VIController package, the COMclock hardware/firmware (a real-time clock with battery backup), the COMsense hardware package and associated software. You can use these packages as stand-alone units or combine them to create a powerful home-management system. (A creative Florida tomato grower plans to use his C-64 and Genesis system to control irrigation on 200 acres!)

The basis of the system is the VIController. You'll also need modules, as you did with the X-10 system. So head for your local Radio Shack or Sears to purchase one or more modules, as Genesis does not sell them directly.

Security is one obvious application of the Home Control System. We liked being able to vary the times that the lamps and appliances turned on and off. For example, we ordered the light swiched off at 11:30 on Friday and Saturday nights, and at 10:30 the rest of the week. The advantage of this option is you can make your behavior less predictable and your absence less noticeable. (This option was also available on the X-10.)

The software for the Home Control System consists of three programs: Manual Control Program (MCP), Time Control Program (TCP) and Super Schedule Program. The Manual Control Program allows you to control the modules and turn lamps and appliances on and off. The Time Control Program enables you to set up a daily schedule for the action to happen.

The Super Schedule Program lets you set up a seven-day schedule for your system (for example, ordering an action to occur Monday, Wednesday and Thursday).

As with the X-10, we needed to make sure that our module codes were correct. This time, we decided to use "L4" for our kitchen radio. The first few times the radio switched on, right on schedule, were very dramatic events!

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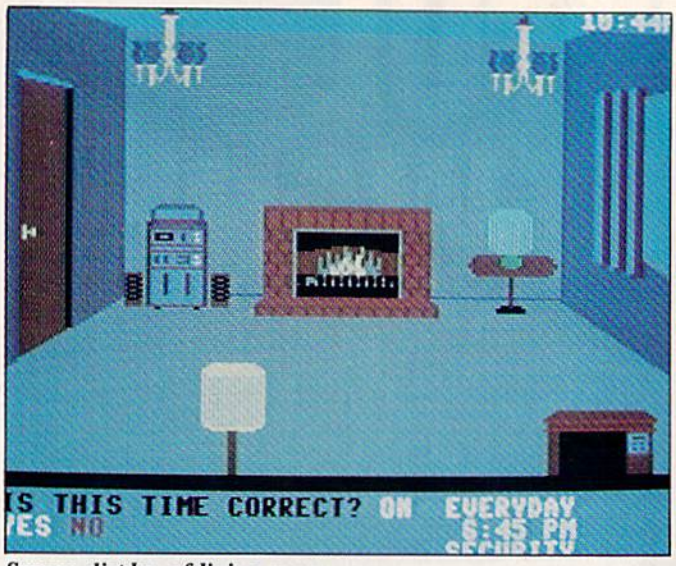

Screen display of living room.

The program allows you to print out your schedule, which is helpful, since the program provides neither on-screen graphics nor a map of where each module is installed. Consequently, you need to draw a diagram showing each module's location.

The COMclock, another major package, provides an innovative solution to the problem of power outages. In most home computer installations, if you lose your electricity for either minutes or hours, your computer's memory is erased and your data is lost forever.

However, the COMclock plugs into your cartridge slot and provides you with a battery-powered, real-time date/time clock. In the event of a power outage, it will also autoboot the disk in your drive (or the tape in your recorder) at powerup. (You must change the name of the scheduling program to "AUTOBOOT". Consult your Commodore manual to see how to do this.)

We used the COMClock for several months and experienced several power outages in our thunderstorm-prone area; the autoboot function performed flawlessly. And, when the computer reloads, it also regains control of the modules and maintains the correct time via the battery-powered COMclock.

The final and most unusual part of this system is COMsense. This unit allows you to simultaneously connect, through the joystick port of your C-64, as many as six individual sensors (two analog and four digital) that respond to outside stimuli.

The hardware part of COMsense is a well-constructed module containing a terminal block and a cord with joystick connector. The sensors are connected to the terminal block with wires that you supply. We found that we also needed a voltmeter to set up the analog sensors for this unit. (According to company executives, Genesis is currently preparing a turnkey radio-frequency plug-in unit to replace COMsense. This should satisfy most non-technical computer owners.)

To use your COMsense hardware, you'll need the Super Schedule Program. You can run it as a machine language routine in the background, while simultaneously using your computer to run other programs written in Basic.

We purchased such digital sensors as a magnetic switch and an associated magnet to use with our COMsense package. (This kind of switch is commonly used in burglar alarms.) After we set it up, the following occurred: When a window was opened, the magnet moved away and the switch opened. As a result, whatever alarm signal we'd arranged was triggered.

We also purchased a package of five cadmium sulfide photo cells (part #276-1657) from our local Radio Shack store to test COMsense's analog capability for testing light levels. Using the instruction manual and our voltmeter, we adjusted the COMsense module and programmed the computer to sense a wide range of light levels. Then we directed the computer to turn on increasing numbers of lights as it became darker outside.

Why? Just because it's 6 PM, it doesn't mean it's always dark outside. And, on stormy days, it might become dark earlier than usual. Thus, time isn't always the best indicator of when to switch on the lights.

Something else we are experimenting with is a temperature-sensitive application, because we'd like to see if we could better control our central heating and air-conditioning systems. For example, during the summer, we'd like to reduce those painfully high Florida air-conditioning expenses. (If you live up north, you might have some interest in cutting back on your heating bills.)

We decided we could use this package to let us know when the inside air temperature falls below the outside temperature. For example, if it were, say, 75 degrees outside and 80 degrees inside, we'd have a radio turn on as a signal to us to shut off the air conditioning and open

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the windows. Or, we could have the computer turn off the air conditioner and turn on the indoor fans.

Conversely, if you're using a wood stove (perhaps in your basement) for heating, you could program the computer so that when it sensed the temperature was above 85 degrees next to the stove, it would turn on fans to propel the hot air upwards.

We were impressed with this sophisticated system and the great degree of control it provides. Disadvantages? The computer must be on at all times, and both expansion and cartridge ports are necessary to take full advantage of this package.

We also think it would be helpful if Genesis would suggest where we could buy, either locally or by mail, the sensors we needed for the COMsense module. Genesis officials told us that many large electrical-supply stores either stock or will order high-capacity BSR modules and other devices.

The VIController, COMsense and COMclock are available for $69.95 each; the Super Schedule Program retails for $19.95. Or, you can purchase the entire Genesis Home Control System for $199.95. Genesis Computer Corp., Ben Franklin Technology Center, Lehigh University, Bethlehem, PA 18015.

Conclusion

Both systems are creative and exciting state-of-the-art applications for the C-64. (By the way, the Genesis Home Control System can also run on an expanded VIC-20.)

The X-10 Powerhouse is more of a turnkey operation, in the sense that the software walks you through the program and you can purchase the necessary modules directly from the company. Another advantage of the X-10 system is that, except when you are setting up or making changes, it leaves your computer available for other uses.

The Home Control System is comprehensive and more sophisticated in that events are not only time-driven, but you can also use outside sensors to determine when or if an action occurs. Other applications are limited only by your own imagination.

The principal disadvantage of the Genesis package is that your computer must remain on 24 hours a day, and you're limited in the software you can run while the system is in operation.

If you'd like an eminently practical application for your computer, why not try one of these home-control systems? Compare their offerings and decide which will fulfill your particular needs. Both can provide you with savings in energy and money, as well as with added security for your home. Then, once your system is up and running, you can relax and enjoy computerized control of your futuristic home. R

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A Printer For All Reasons

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Our Objective Was Simple

We wanted to find that printer which had all the features you could want and yet be sold directly to you at the lowest price. We didn't want a "close-out special" of an obsolete product that some manufacturer was dumping, so we limited our search to only those new printers that had the latest proven technology. We wanted to give our customers the **best** printer on the market today at a bargain price.

The Results Are In

The search is over. We have reduced the field to a single printer that meets all our goals (and more). The printer is the SP-1000 from Seikosha, a division of Seiko (one of the foremost manufacturers in the world). We ran this printer through our battery of tests and it came out shining. This printer *can* do it all. Standard draft printing at a respectable 100 characters per second, and with a very readable 12 (horizontal) by 9 (vertical) character matrix. This is a full bi-directional, logic seeking, true descender printer.

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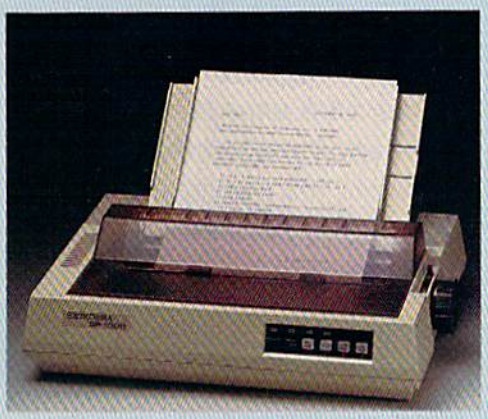

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Songfest

By JOE KACZYNSKI

With this multifunctional music editor, you can jam with your Commodore or just sing along with some prerecorded songs. If you're especially musical, you can create songs in three-part harmony.

Songfest is designed for the broadest of audiences, ranging from the musical novice to the professional musician. This program allows you to utilize to the fullest extent the little-understood SID (sound interface device) chip.

Now, your Commodore can use up to three voices to play any song. You need only take the sheet music of your favorite song and, following simple menu-driven questions, enter that song. You can then play it back, modify it to your individual taste, if desired, and then save it to the disk for playback at any time.

Since songs require an unusually large amount of disk space and are sequential in nature, you must use disks to hold them. I suggest you start by formatting a new disk before you proceed with this program.

As you may already know, the Commodore 64 SID chip is the heart of the 64's music capabilities. This highly sophisticated integrated circuit makes the Commodore a unique instrument indeed. It provides the 64 with a three-voice (three-instrument) and full eight-octave electronic music synthesizer.

More information on the capabilities of the 64 and the SID chip may be found in various chapters of the *Commodore 64 Programmer's Reference Guide*. You may want to refer to this guide if you wish to do some additional experimentation with various parameters involved with the attack/decay and sustain/release (A/D and S/R) settings. Fortunately, you won't need to read any more than this article to fully utilize your 64's music capabilities.

Songfest has many features that make it very easy to use. To get an accurate reproduction of a particular song, you must enter each note. However, you must also realize that music is made up of a complex combination of notes, rests, tempos, rhythms and octaves. All of these combine to make a song. The correct combination of all these variables is available to everyone, directly from sheet music. Songfest makes it easy to set this data into your 64 in the appropriate form.

RUN It Right

C-64; C-128 (in C-64 mode)
Disk drive only

When you have entered Songfest into your 64 and saved it, run the program. You will see the following:

```
Welcome to Songfest
Menu
R  =  read preprogrammed song from disk
P  =  play song once
C  =  continuous play; hit space bar to end
I  =  input notes of your own song
A  =  add notes to song
M  =  modify waveform, A/D, S/R
S  =  sound change during playback
E  =  error correction after input
K  =  keyboard function
Q  =  quit and exit program
```

Any time you wish to leave Songfest and return to Basic, simply press Q (quit and exit program) while viewing the main menu.

Menu Explanation

R—read preprogrammed song from disk. If you wish to load a preprogrammed song that you have previously saved, you select this option on the main menu. When you do this, be sure to select the number of voices in which you saved the song.

There is, of course, no way for Songfest to know how many voices your own creation used. When the screen displays the question, "How Many Voices Would You Like?", you are simply being asked how many voices were actually stored to the disk when you last saved the song. If you

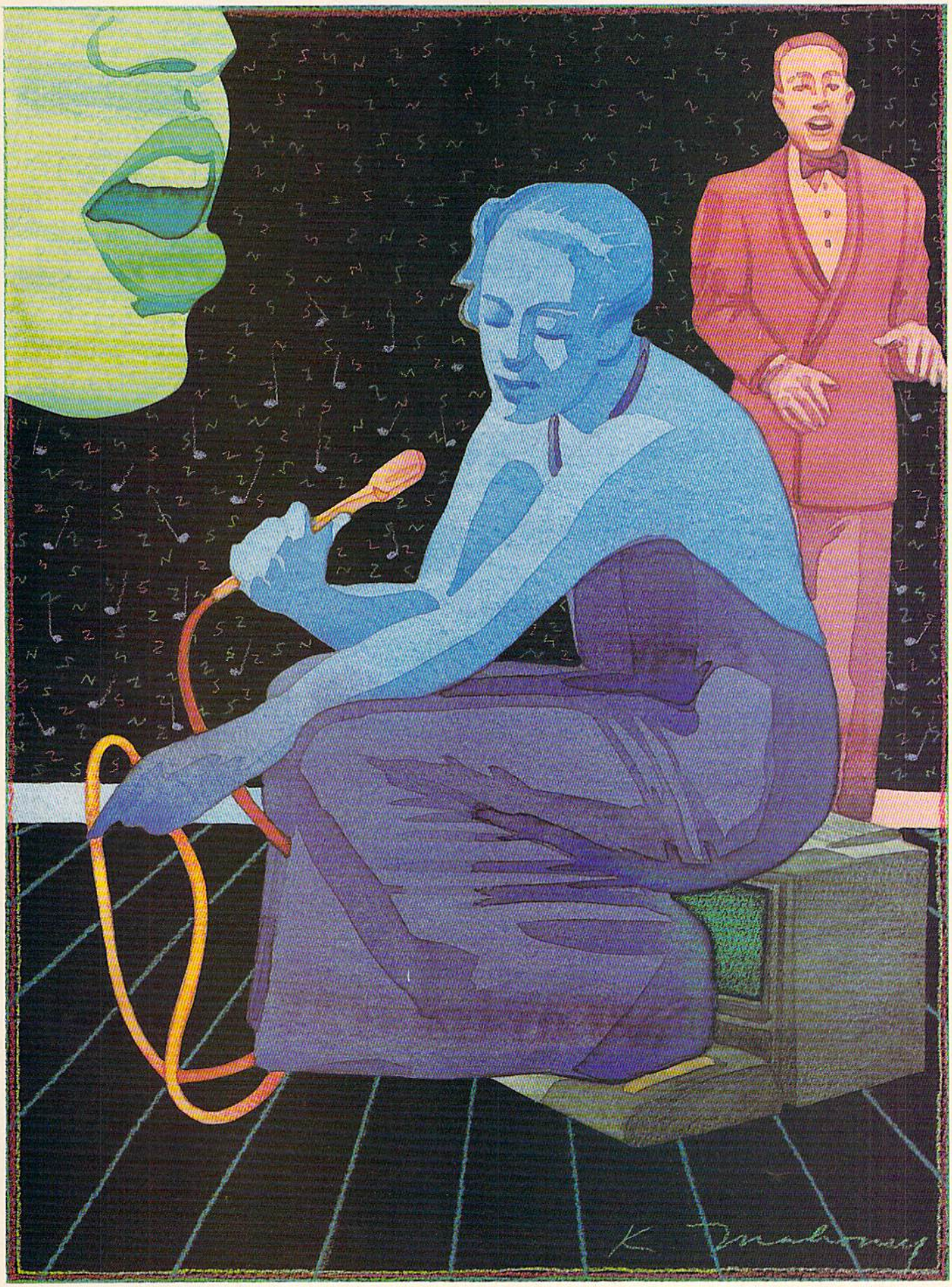

Illustration by Katherine Mahoney

try to read more voices than you actually stored, you'll get an error. Similarly, if you try to read fewer voices than you wrote, you will also get an error.

You will then be asked for the name of the song. Type in its name exactly as it appears on the disk's directory, but without the quotes. Once your song is loaded, it will begin playing automatically. When it is finished playing, you may select P or C.

P—play song once or *C—continuous play*. These two menu options seem clear enough, but there are a few things you might like to know about them. First, you can play back any song in the number of voices in which it was recorded (saved). You can also play it back in fewer voices, but you can't play it in more voices, since those voices are just not there. If you choose C, pressing the space bar at any time will end the song and return you to the main menu.

I—input notes of your own song. When this option is selected, the screen clears and displays the following messages. These enable you to set up all the necessary parameters critical to the types of voices your songs will play in. Parameters for voice 0 are now:

```
W/F—0, A/D—0, S/R—0
Select waveform (17,33,65)
Select A/D (0–255)
Select S/R (0–255)
```

Also, if the waveform 65 is selected, the following additional message appears:

```
High Pulse (0–15); a suggestion is 8
Low Pulse (0–255); a suggestion is 128
```

When you initially enter your songs, I suggest you use the following values, although later you may wish to experiment with others. Incidentally, if you only wish to change one of these parameters in a voice, you may press the return key until you get to the specific parameter you wish to change.

```
Voice 0 W/F = 17 A/D = 9 S/R = 240
Voice 1 W/F = 33 A/D = 10 S/R = 120
Voice 2 W/F = 33 A/D = 10 S/R = 85
```

When the above information has been entered, the following message will appear: "Enter Notes For Voice 0, Enter 0,0,0, To Go To Next Voice."

The notes available to you are: C, C#(Db), D, D#(Eb), E, F, F#(Gb), G, G#(Ab), A, A#(Bb) and B.

Note that # signifies sharp and b denotes a flat. To enter a sharp, press Shift 3. To enter a flat, press Shift 6 (&). The & symbol is used to distinguish a flat from a lowercase b.

Auld Lang Syne.
ROBERT BURNS.
SCOTCH AIR.
1. Should auld acquaintance be for-got, And nev-er bro't to mind? Should auld ac-
2. And here's a hand, my trust-y frien', And gie's a hand o' thine; We'll tak' a
REFRAIN.
quaintance be for-got, And days of auld lang syne?
cup o' kind-ness yet, For auld lang syne. For auld lang syne, my dear, For
auld lang syne; We'll tak' a cup o' kind-ness yet For auld lang syne.

Figure 1. *Auld Lang Syne sheet music.*

You are now ready to input notes from your sheet music or from the example Auld Lang Syne (Figure 1). As indicated earlier, music is very complex. Although this program makes entering this data quite straightforward, you must take great care in entering each note, octave and duration, and you must enter them in just that particular format—note, octave, duration.

Specifically, the format must be a note (which may be a letter by itself or a letter and a sharp or flat) followed by a comma, plus an octave number followed by a comma and, finally, a duration number. For example: C#,5,4. (Refer to Figures 2 and 3.)

A comma must be used to separate off each entry, or it will be rejected and you'll be prompted with a Redo From Start error message. You may then reinput the line where the error occurred.

Generally, it's good practice (initially) to enter just one complete line of sheet music at a time (as in my example). This is typically four measures. If you've completed the first voice and wish to move on to the next voice, enter 0,0,0.

Entering another voice involves reentering the same number of measures, even though the notes, octaves and durations are different. You will notice that, as each note, octave and duration is entered, a measure number will appear to the right. This is to assist you if a note change has to be made later.

The most critical point to remember is that even if you make a mistake, you must still complete the same measure total for all the voices you are entering before you can correct a mistake.

When you make a mistake, simply jot down the measure number where the mistake occurred. If you don't complete the proper measure count for all voices, the entire series must be redone from the last "A = Add Notes To Song" selection.

It's a good practice to write down the final measure number before you go on to the next voice. When you complete the next voice, you can then compare and be sure that the measure numbers are the same. Therefore, until you become more familiar with this procedure, enter only a maximum of four measures at a time for all the desired voices.

Now use the A option to continue your input. This way, if you make an error, you will only have to enter, at

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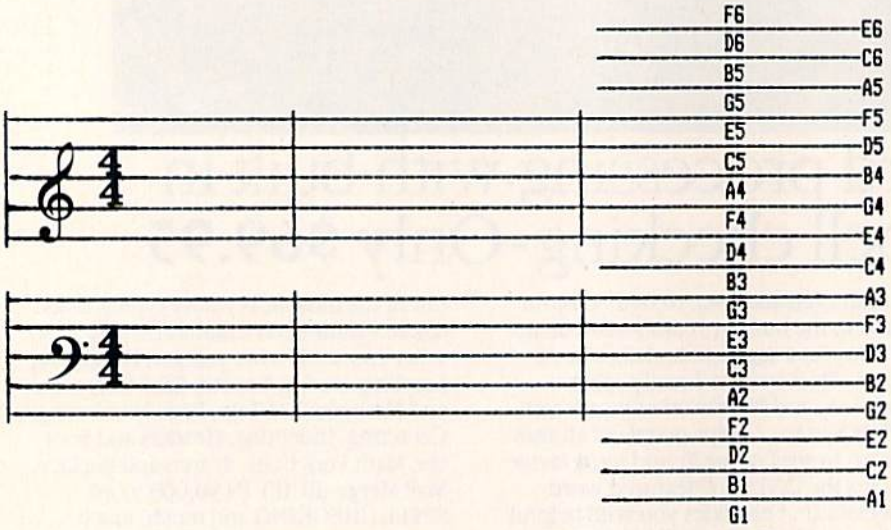
NOTE TYPE	DURATION	EXAMPLE
Whole note	16 beats	𝅝
Dotted half note	12 beats	𝅗𝅥.
Half note	8 beats	𝅗𝅥
Dotted Quarter note	6 beats	♩.
Quarter note	4 beats	♩
Dotted Eighth note	3 beats	♪.
Eighth note	2 beats	♪
Dotted sixteenth note	1.5 beats	𝅘𝅥𝅯.
Sixteenth note	1 beat	𝅘𝅥𝅯
Whole rest	16 beats	𝄻
Half rest	8 beats	𝄼
Quarter rest	4 beats	𝄽
Eighth rest	2 beats	𝄾

Figure 2. *Songfest Reference Guide.*



NOTE AND OCTAVE IDENTIFICATION CHART

This is a sample staff with all the notes labeled. The letter indicates the note name and the number indicates the octave. These are the values you will be using during the Add or Input mode in Songfest. Simply find the placement of the note from your sheet music by using this guide.

Figure 3. *Songfest Reference Guide.*

most, four measures of the song. When the selected number of voices have been properly entered, play the song to make sure you find it pleasing. If you are satisfied, press the A option again and continue inputting your song.

If you feel a note is incorrect, use the E option. You will be asked which voice contains the error (0, 1 or 2) and for the measure number just before the note to be changed.

Up until the time you press the return key, you may edit as always by pressing the delete key and retyping the data. Once you press the return key, your data is saved within Songfest. Changes at this point require the use of the E option. Duration errors are basically fatal, because they offset the entire song's timing and measure count, therefore requiring reentry of the entire song.

If you discover an error in a note or octave, mark down the measure number that's beside the incorrect entry. Continue entering until you have entered all notes up to the previous voice's measure number. (Remember, all voices must have the same number of measures.) If you've decided to enter all three voices, all three must be at the same measure number before you will have a correct song.

This will return you to the main menu, where you can select the E option. This will ask you which voice you'd like to change. You'll then be asked for the measure number of the incorrect note. After Songfest finds the note, you'll be asked to reenter the note and the octave.

M—modify waveform. After working with Songfest for a while, you may wish to do some experimentation of your own. This option gives you the capability of playing back your song in just about any combination of waveform and attack/decay and sustain/release parameters possible on your 64. The M option will first tell you what the present settings are and then ask you to input your new selections. The A/D and S/R parameters are explained fully in the sound section of your user's manual.

The suggested waveforms are: a triangle, which is 17; a sawtooth, which is 33; and a pulse, which is 65. You may also select different settings for the A/D and S/R parameters.

These parameters all affect the types of sounds the SID chip produces. By careful experimentation and selection, you'll be able to re-

COMMODORE 64/128K

CHARTBUSTERS

firebird

Super SILVER DISK

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The gems your pockets will not fill
Tho' energy they'll make you fast
And gargoyles then you will get past
Up and up, the journey's slow
So down is first the way to go.

The old travellers' words still singing in my head.

WILLOW PATTERN

The beautiful Princess Koong-Shee is being forced to marry a merchant, Ta Jin against her will. She really loves a clerk, Chang, who's only hope is to force his way to the Mandarin's palace against terrible odds and help her to escape. Now play on...

BOOTY

Well shiver me timbers and splice the mainbrace and pass the grog, me hearties. Here be the greatest pirate adventure of them all, aboard that scourge of the Seven Seas – the dreaded Black Galleon. Feast yer eyes on the BOOTY-ful treasure stored in 20 holds. There be pirates, parrots and fun galore. If you don't like it, matey, we'll hang you by the highest yard-arm!!!

SABRE WULF

The Warning

Thy path is long so tread with care
Beware the wulf and pass his lair
Danger threatens all around
So take ye from this hidden mound
To free thee from this sunken gate
By way of cave or meet thy fate
An amulet to seek thy will
'Twas split by quad and hidden still
Pass the keeper wrought with hate
To gain an entrance to the gate
The pieces lost must thee amass
For if no charm then none shall pass

CHIMERA

Investigations have traced the source of erratic radio signals to a giant alien vessel, orbiting the Earth high in the exosphere. That the craft is hostile, there is no doubt; somebody will have to go aboard and find out how to eliminate the threat.

CYLU

Greetings Cylu, Warrior King, to the land of Evol. Our people need a new leader to make us great again. He must be agile, and show that he is wise and strong, and so we have devised a test. If you pass, you will prove that you are worthy. If you fail...

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COMMODORE 64/128K

```
Voice 0: W/F=17   A/D=9     S/R=240
Voice 1: W/F=33   A/D=10    S/R=120
Voice 2: W/F=33   A/D=10    S/R=85

Voice 0   Voice 0   Voice 1   Voice 1   Voice 2   Voice 2
N, O, D   N, O, D   N, O, D   N, O, D   N, O, D   N, O, D
-------   -------   -------   -------   -------   -------
S, 4, 12  C, 5, 6   S, 4, 12  F, 4, 8   S, 4, 12  A, 3, 6
C, 4, 4   A, 4, 2   C, 4, 4   F, 4, 8   C, 4, 4   C, 4, 2
          A, 4, 4                                 C, 4, 4
F, 4, 6   C, 5, 4   C, 4, 6               A, 3, 6   A, 3, 4
F, 4, 2             C, 4, 2               A, 3, 2
F, 4, 4   D, 5, 12  C, 4, 4   F, 4, 12   A, 3, 4   A#,3, 12
A, 4, 4   D, 5, 4   F, 4, 4   F, 4, 4   C, 4, 4   D, 4, 4

G, 4, 6   C, 5, 6   E, 4, 6   F, 4, 6   C, 4, 6   C, 4, 6
F, 4, 2   A, 4, 2   D, 4, 2   F, 4, 2   A, 3, 2   C, 4, 2
G, 4, 4   A, 4, 4   E, 4, 4   F, 4, 4   A#,3, 4   C, 4, 4
A, 4, 4   F, 4, 4   E, 4, 4   C, 4, 4   C, 4, 4   C, 4, 4

F, 4, 6   G, 4, 6   F, 4, 6   E, 4, 6   A, 3, 6   C, 4, 6
F, 4, 2   F, 4, 2   F, 4, 2   D, 4, 2   A, 3, 2   C, 4, 2
A, 4, 4   G, 4, 4   F, 4, 4   E, 4, 4   C, 4, 4   C, 4, 4
C, 5, 4   A, 4, 2   F, 4, 4   E, 4, 4   A, 3, 4   A, 3, 4
          G, 4, 2

D, 5, 12                F, 4, 12  D, 4, 6   A#,3, 12  A, 3, 6
D, 5, 4   F, 4, 6   F, 4, 4   A, 3, 2   A#,3, 4   F, 3, 2
          D, 4, 2             A#,3, 8             F, 3, 4
C, 5, 6   D, 4, 4   F, 4, 6               C, 4, 6   E, 3, 4
A, 4, 2   C, 4, 4   F, 4, 2   A, 3, 12   C, 4, 2
A, 4, 4             F, 4, 4   S, 4, 4   C, 4, 4   F, 3, 12
F, 4, 4   F, 4, 12  F, 4, 4             A, 3, 4   S, 4, 4
          S, 4, 4             0, 0, 0
G, 4, 6             E, 4, 6               C, 4, 6   0, 0, 0
F, 4, 2   0, 0, 0   D, 4, 2               A, 3, 2
G, 4, 4             E, 4, 4               A#,3, 4
A, 4, 4             E, 4, 4               C, 4, 4

F, 4, 6             D, 4, 6               A, 3, 6
D, 4, 2             A, 3, 2               F, 3, 2
D, 4, 4             A#,3, 4               F, 3, 4
C, 4, 4             A#,3, 4               E, 3, 4

F, 4, 12            A, 3, 12              F, 2, 12
D, 5, 4             F, 4, 4               A#,3, 4

C, 5, 6             F, 4, 8               A, 3, 6
A, 4, 2             F, 4, 8               C, 4, 2
A, 4, 4                                   C, 4, 8
F, 4, 4             E, 4, 6
                    D, 4, 2               C, 4, 6
G, 4, 6             E, 4, 4               A, 3, 2
F, 4, 2             E, 4, 4               A#,3, 4
G, 4, 4                                   A#,3, 4
D, 5, 4
```

Figure 4. *Auld Lang Syne input data.*

produce various musical instruments. The possibilities are virtually endless for the types of sounds you can create, including those unique to the SID chip itself.

S—sound change during playback. This menu selection lets you experiment with various sounds without really understanding anything about waveforms or A/D and S/R settings, which you may not yet have had time to learn. Once you've loaded a song, either from the disk or the keyboard, press S. Pressing f1, f3, f5 or f7 will play the song with different preselected voice parameters. If, after experimenting on your own, you like the sound you've created, you may change these parameters yourself. They are located in lines 920–970 of the program.

K—keyboard synthesizer. The keyboard synthesizer is another great feature of Songfest. Basically, what the K selection yields is a screen of help text, which gives you various alternatives to selecting, tuning and playing your new musical instrument, the Commodore 64.

The f1, f3, f5 and f7 function keys select the octave in which you wish your instrument to play. (f1 is the highest octave; f7, the lowest.)

The f2, f4 and f6 keys select the waveform or instrument type you wish your Commodore to be. You'll find f2 to be a smooth, mellow sound, while f6 tends to be a bit twangy.

Pressing f8 allows any note to continue to play until you press the next note. This is called maintaining the note. Some instruments, such as the accordian and many organs, are capable of maintaining notes in this fashion.

Pressing the space bar yields another interesting variation—polyphonic sound, which is much like a harpsichord. To deactivate this, press the space bar again.

Also displayed on the screen is a small chart, the index, which turns the 64 into the keyboard of a musical instrument. Each available note is listed. Beneath each one is displayed the corresponding letter that you must type to produce this sound. To return to Songfest, you may press Z at any time.

Q—quit and exit program. This selection, of course, returns you to Commodore Basic. If you accidentally press Q while inputting or playing your song, you can recover by immediately entering GOTO 40 in the Direct mode.

Songfest Sample Application

The following section will assume that you have an understanding of the basics of music.

Relax now, and I'll take you through a brief example of entering music into Songfest.

First, be prepared to reference Figures 2 and 3, the Songfest Reference Guide. Second, take a look at the sample song on the sheet music provided in Figure 1. Third, reference Figure 4, which is a list of all the note entries for the song, "Auld Lang Syne." This is the entire song in all three voices. Wait until you hear it! Let's begin.

Type I to enter the Input mode. You will then see another display asking you how many voices you'd like to enter. For this example, enter 3. You'll then be presented with another selection choice. What parameters or waveform type would you like for Voice 0? For this example, use the following parameters for Voices 0, 1 and 2 as indicated below:

```
Voice 0 W/F  =  17
Voice 0 A/D  =   9
Voice 0 S/R  =  240
Voice 1 W/F  =  33
Voice 1 A/D  =  10
Voice 1 S/R  =  120
Voice 2 W/F  =  33
Voice 2 A/D  =  10
Voice 2 S/R  =  85
```

Of course, you may change these parameters during the playback if you're not happy with them.

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After selecting these parameters, which basically select the "instruments" that will play the song you're about to enter, you will be presented with the note input questions. From here, you just need to enter the data listed in Figure 4.

But why don't you look at this whole process a little closer? If you look at the sheet music, you'll notice a time signature of 4/4. This means that you have to treat each measure as if it had 16 beats. For a 4/4 time signature, all (and I do mean *all*) measures must have a total of 16 beats. On the other hand, a 3/4 time signature would have 12 beats per measure.

The funny-looking sign on the left of the music is called a G clef. To the right of that is a flat designation (b) on the staff line B (remember, Every Good Boy Does Fine). This tells you that every time you encounter the note B, you must enter it flat (shift 6). Another interesting way to input B flat is to enter A sharp (A#).

You may always use this conversion if it's easier for you to remember. To visualize this a little better, you might picture a flat as being a half step below a given note and a sharp as being a half step above a given note. Therefore, an A sharp is equal to a B flat. Similarly, an F# is equal to a G flat. All right, let's get back to the sheet music.

Knowing that each measure has to have 16 beats because of the time signature 4/4, let's take a look at the first measure in "Auld Lang Syne." There's only one note there, and it's a quarter note, which, according to your reference chart, is only supposed to get four beats.

What to do now? Well, this happens sometimes, but, remember, all measures with this 4/4 time signature must have 16 beats, or the song is not going to sound right. Here you can utilize a "rest" to fill the unused beats in the measure. Enter S,4,12 as your first entry. Then enter C,4,4 for the quarter note. That gives you a total of 16 beats, and you're in business.

You can enter as many notes as you'd like (up to 90 measures) in each voice, but I strongly suggest that, until you are thoroughly familiar with the program, you enter only four measures at a time. Enter the four measures, then enter 0,0,0 to move on to the next voice, and repeat this procedure until all three voices are complete. Play the song to make sure it's all right. Now use the A option to continue inputting. After you've finished, sit back and listen to what you have accomplished. It sounds great, doesn't it?

Now that you're an accomplished musician, you're ready to tackle other songs. If you feel you're ready for the big step, enter an entire song in one voice before going on to the next voice, and soon the entire song has been entered.

Hints for Advanced Users

To suit your own taste, you may change the number of beats that each note normally gets, but only if you change all others accordingly. For example, if you purchase some sheet music, enter it into Songfest and find that the tempo is too slow or too fast, you can change the speed by altering the note-duration value.

In a song that is playing too quickly, double the duration value of each note. Give a whole note 32 beats, a half note 16 beats, a quarter note eight beats, and so on.

In a song that's being played too slowly, cut the duration in half. Give a whole note eight beats, a half note four beats, and so on. Remember, make sure all notes are treated proportionately. Don't be afraid to experiment. As long as each voice has the same number of measures, there will be no difficulty.

Here's another hint that may clarify some points on A/D and S/R settings. As an advanced user, you may understand that the actual settings of A/D and S/R are actually controlled by two bytes in the SID chip. The upper nibble of the A/D byte is A, and the lower nibble is D. The same holds true for the S/R byte—S being the high nibble and R being the low nibble.

What this means is that a little calculation is necessary to obtain meaningful values of A/D and S/R. First, select the desired value of decay (D) and release (R) between 0 and 15. Remember, a lower number means a quicker decay or release rate. Now pick a value for attack (A) and sustain (S) from 0 to 15.

The lower the attack number, the faster the note rises to its initial peak. The sustain value determines the amplitude (volume) during the sustain portion of the note.

Now, to calculate the actual value of A/D from 0 to 255, take the value (from 0 to 15) you have selected for the attack and multiply it by 16. Then, add this value to the value you have selected for the decay (from 0 to 15). This will give you the correct number to enter to select A/D. The same procedure applies for sustain and release.

You are now well on your way to becoming a great computer musician. Good luck. R

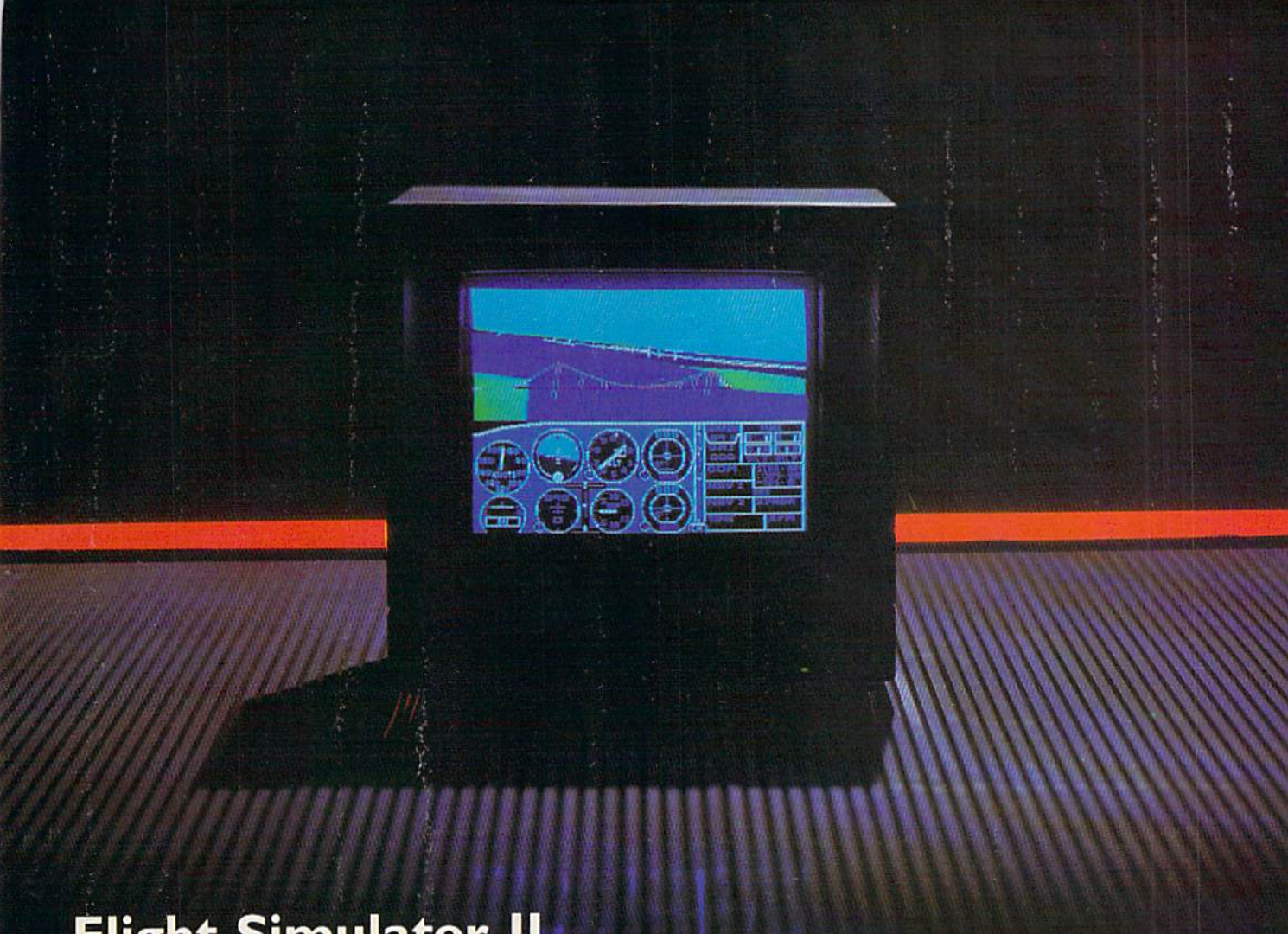
Note: In future issues we will publish lists of input notes for various songs that you may use with Songfest. We welcome contributions from our readers. If you have entered any songs in the public domain that you would like to share with us, send a disk and a printout of the notes to: Songfest, RUN *Magazine, Technical Dept., 80 Pine St., Peterborough, NH 03458.*

Address all author correspondence to Joe Kaczynski, 89 Hillcrest Ave., Methuen, MA 01844.

Listing 1. *Songfest program.*

```
Ø REM:MUSICOM 64:COPYRIGHT 1985 BY JOE KACZ
  YNSKI                                  :REM*78
5 CLR:S=54272:FORL=STOS+24:POKEL,Ø:NEXT
                                         :REM*21
1Ø DIMH%(2,145Ø),L%(2,145Ø),C%(2,145Ø),D(3)
  ,R(3),V(3),FQ(11):Z=Ø                  :REM*18
15 FORA=ØTO11:READFQ(A):NEXT:POKE53281,Ø
                                         :REM*153
2Ø POKE5328Ø,2:PRINT"{SHFT CLR}{CRSR RT}{CT
  RL 9}{COMD 7}{38 SPACEs}{CTRL Ø}"
                                         :REM*188
25 PRINT"{CRSR RT}{CTRL 9}{CTRL 2}{1Ø SPACE
  s}{CTRL 9}{CTRL 6}WELCOME TO SONGFEST{CT
  RL 2}{9 SPACEs}{CTRL Ø}"               :REM*57
3Ø PRINT"{CRSR RT}{CTRL 9}{COMD 7}{38 SPACE
  s}{CTRL Ø}"                            :REM*3Ø
35 PRINT"{17 CRSR RTs}{CTRL 9}{CTRL 2}MENU{
  CTRL Ø}"                               :REM*133
4Ø PRINT"{2 CRSR RTs}{CTRL 2}R{COMD 7}= {CT
  RL 2}READ {COMD 3}PREPROGRAMMED SONG FRO
  M DISK"                                :REM*178
45 PRINT"{CRSR DN}{2 CRSR RTs}{CTRL 2}P= PL
  AY {CTRL 6}SONG ONCE"                  :REM*129
5Ø PRINT"{CRSR DN}{2 CRSR RTs}{CTRL 2}C= {C
  TRL 2}CONTINUOUS {COMD 3}PLAY{4 SPACEs}{
  CTRL 9}{CTRL 2}SPACEBAR {COMD 3}TO END{C
  TRL Ø}"                                :REM*14
```

Continued on p. 98.



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RUN Script 64

This month, we will give RUN Script 64 new muscles by adding programs that let you access your printer's codes and customize this word processor.

By ROBERT ROCKEFELLER

This month I will explain how to customize RUN Script 64 to accommodate your own system setup and personal preferences. As I said last month, if you have a Commodore-compatible printer, it's not necessary for you to customize RUN Script 64. For those with other types of printers, I will first explain about RUN Script 64's printer-macro facility, and then the customizing procedure.

Defining Printer Macros

Many C-64 owners use non-Commodore printers such as the Okimate 10 or Epson MX-80. Such printers often have many desirable features, like italic character sets, the ability to do underlining, and so on. The printer-macro feature of RUN Script 64 was designed to allow you to customize your copy of this word processor so you can take full advantage of whatever capabilities your printer may possess.

You may select any upper- or lowercase alphabetic character to be a macro character. You then create a table of printer macros with an easy-to-use Basic program called Define Macros (Listing 1). Each macro character represents a string of user-defined characters. When a macro character is encountered during printing, this string, rather than the macro character itself, will be sent to the output device.

For example, let's say you own a printer that requires the sequence ESC X (decimal values 27,88) to start printing double-width characters. With Define Macros, you could select a character—D, for instance—to represent this two-character string. Then, when D is encountered during printing, the decimal sequence 27,88 would be sent to the printer, resulting in double-width characters. You could then define another character, perhaps d, to represent the correct sequence to stop printing double-width characters.

This macro feature is most useful for printing titles and subheadings. To create a double-width heading, first place the cursor in front of the heading. Next, press the f3 key. A *mac* message will appear on the status line. Press the upper- or lowercase alphabetic character you've chosen to activate the double-width capability (in my example, D). Finally, move the cursor to the end of the heading, press f3 again, and press the key you've chosen to deactivate the double-width feature (d, in my example). That's all there is to it! If you press any non-alphabetic character, the operation will be aborted.

Your table can be composed of 52 different macro definitions, each of which can be from one to 20 characters long. Exactly 500 bytes have been allocated for the complete macro table.

Customizing Procedure

You can create your own personalized copy of RUN Script, with a custom-character set, default screen colors of your choice, printer parameters you design, and the macro table described above.

Step 1. Type in Listing 2, the RUN Script Params program, and save it to disk. Load the RUN Script 64 Boot program you typed in last month. If you've decided to make use of the printer macro feature, change line 60 to:

```
60 MAC$ = "RUNSCRIPT MACROS"
```

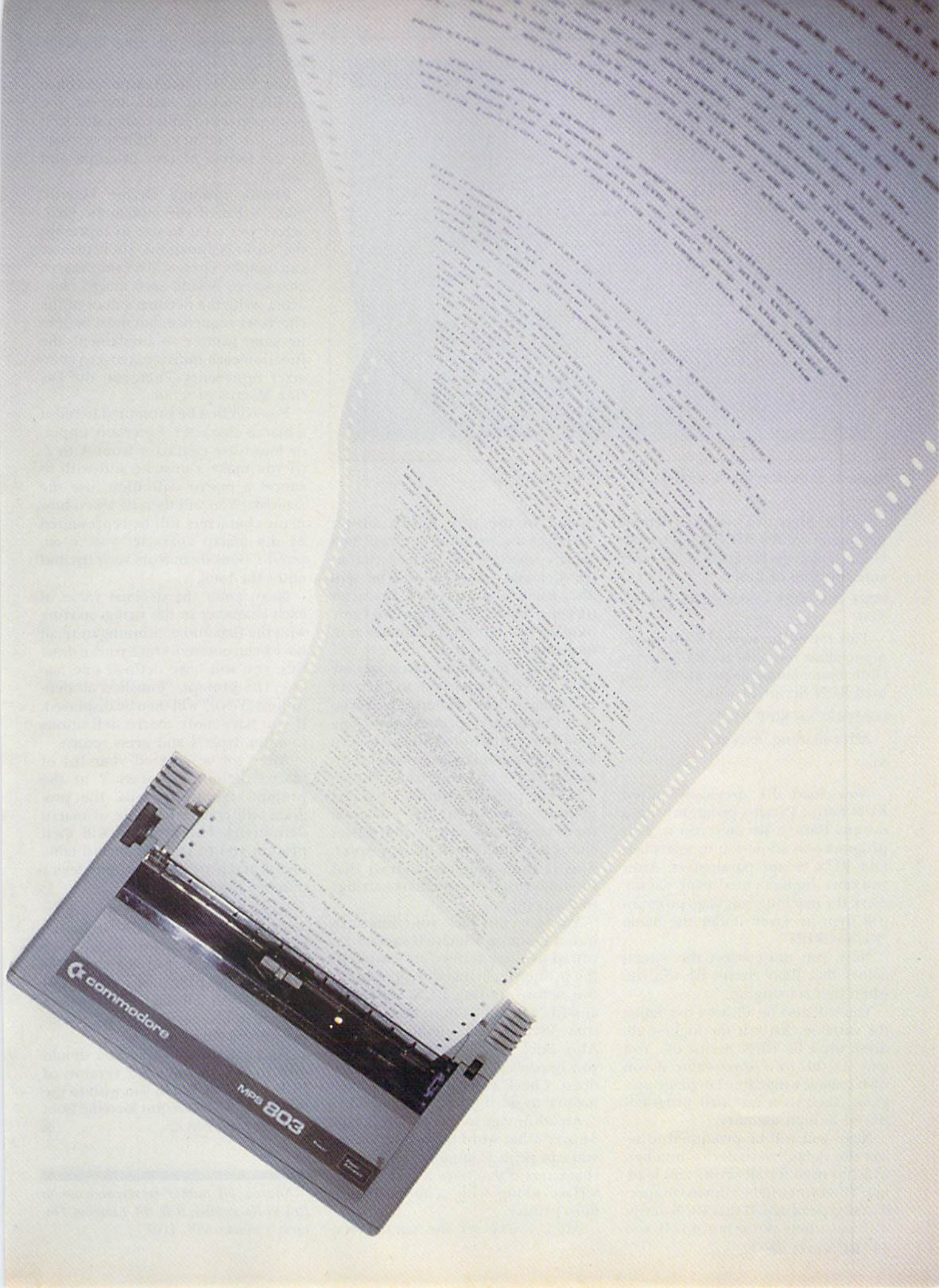
If you're going to use a custom character set (see Step 4), make the variable CHAR$ in line 100 equal the name of your character set. For example, if you've saved a character set under the filename "Big Letters," then change line 100 to:

```
100 CHAR$ = "BIG LETTERS"
```

RUN It Right

C-64; C-128 (in C-64 mode)
Disk drive

Photograph by Edward Judice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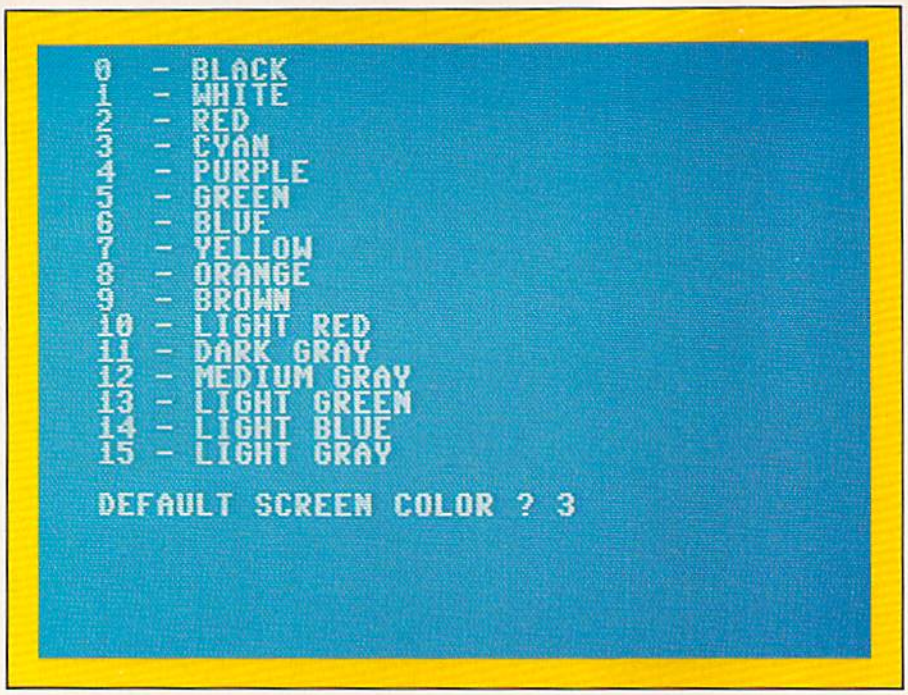


Photo 1. *Screen colors you can select from RUN Script Params program.*

Step 2. Step two sets the default parameters of the RUN Script 64 machine language program. First, execute this line of Basic:

```
POKE 43,1: POKE 44,3*16: POKE 3*4096,0: NEW
```

This raises the start-of-Basic memory to allow room for the RUN Script 64 machine language program. Now, load RUN Script 64 with:

```
LOAD"0:RUNSCRIPT",8,1
```

After loading, execute:

```
NEW
```

Now, load the previously saved RUN Script Params program with a normal Basic load, then run it. This program will allow you to select certain RUN Script parameters. After you have implemented your parameters, the machine language program will then be saved under the name "RUNSCRIPT".

Now, you must select the screen colors that RUN Script 64 will use when first starting up.

You will also be allowed to change the variable that sets the highest address used by RUN Script 64. You may set this to a lower value if you wish to have a machine language program (such as a fast-load program) stored in high memory.

Next, you will be prompted to select the default save-device number, which is used for all saving and loading. Then you will be allowed to specify the type of ASCII that RUN Script will use when powering up. If you intend to use true ASCII, answer "true" at the prompt. You can then specify whether the linefeed character (decimal value 10) will be sent after each carriage return character (decimal value 13). Some non-Commodore printers require linefeeds to move to the next line.

The final parameter, secondary address, is very important to users of non-Commodore printers. Those who own Commodore printers and Commodore-compatible interfaces can leave the secondary address at 7 to specify upper- and lowercase printing.

If your printer requires a parallel interface, check your user's manual for the secondary address that passes characters unchanged to the printer. This is the secondary address that should be used to send macro strings to the printer.

You can also lock your interface into a mode in which characters received by the interface are passed to the printer unchanged. You must do this before starting RUN Script 64, and RUN Script 64 must be set to use true ASCII if this method is used. Also, once your interface is locked, you needn't specify a secondary address. Check your printer interface manual to see if it has this capability.

An advantage to using RUN Script 64 over other word processors is that you can print Commodore graphics characters if you have a graphics interface along with a non-Commodore printer.

After you've set the parameters, the RUN Script machine language program will be saved.

Step 3. If, for some reason, you have decided not to make use of the printer-macro feature, skip this step and go to the next. Otherwise, type in the Define Macros program and save it.

Before running Define Macros, make a list of the alphabetic characters you want to use to represent the various functions your printer can handle. These will be your macro characters. Beside each macro character, write the decimal values of the character sequence that must be sent to your printer to implement the function each individual macro character represents. Then run the Define Macros program.

You will first be prompted to select a macro character. Enter any upper- or lowercase character from A to Z. (If you make a mistake and wish to cancel a macro definition, use the asterisk.) You will then be asked how many characters will be represented by the macro character you've entered. Count them from your list and enter the total.

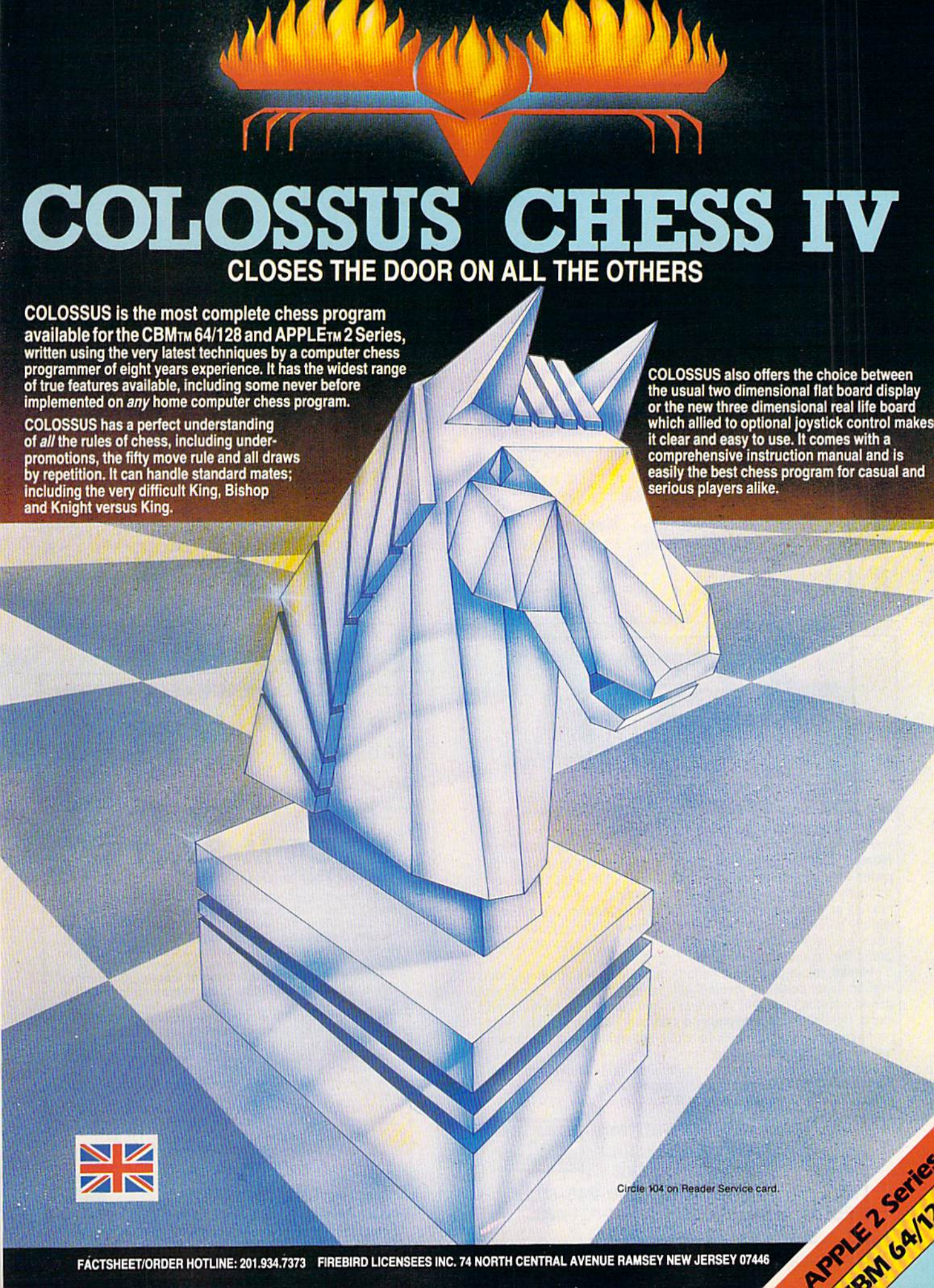
Next, enter the decimal value of each character in the string, starting with the first and continuing until all have been entered. Once you've done this, you will have defined one macro. The prompt, "Finished all definitions (Y/N)?" will then be displayed. If you have more macro definitions to enter, type N and press return.

After you've entered your list of macro definitions, press Y at the prompt. Within seconds, the program will create the table of macro definitions. The program will then prompt you to save the macro table to disk and provide the proper device number.

Step 4. Finally, you must save a character set on disk for RUN Script 64. Unless you have a custom-character set, load RUN Script 64's character set program (from last month) and run it. It will automatically create a copy of the C-64 upper- and lowercase character set on disk.

That's all there is to it. You should now have a customized version of RUN Script 64. When you wish to use this word processor, just load the Boot program and run it. R

Address all author correspondence to Robert Rockefeller, R.R. #4, Langton, Ontario, Canada N0E 1G0.



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Listing 1. *Define Macros program.*

```
10 REM DEFINE MACROS BY ROBERT ROCKEFELLER
                                        :REM*144
90 DIM FLAG%(51) : REM FLAG ARRAY INDICATES
   IF A CERTAIN MACRO IS DEFINED  :REM*160
100 DIM MACRO$(51) : REM HOLDS MACRO STRING
   S                                :REM*146
110 M1$="THIS CHARACTER HAS BEEN USED. WOUL
   D YOU LIKE TO SELECT ANOTHER (Y/N)?"
                                    :REM*34
120 M2$="HOW MANY CHARACTERS WILL BE IN THE
   "                                :REM*6
130 M2$=M2$+"{6 SPACEs}MACRO STRING REPRESE
   NTED BY THIS{8 SPACEs}CHARACTER ? "
                                    :REM*88
140 A=780 : X=781 : Y=782 : REM SYS REGISTE
   RS                               :REM*174
180 REM SELECT MACRO CHARACTER      :REM*248
200 PRINT"{SHFT CLR}{CRSR DN}SELECT A MACRO
    CHARACTER."                     :REM*216
210 GOSUB 1130                      :REM*24
230 IF A$<>"*" THEN 300              :REM*4
240 PRINT"WHICH MACRO DEFINITION DO YOU WIS
   H TO{3 SPACEs}CANCEL ?"          :REM*82
250 GOSUB 1130                      :REM*64
260 IF A$="*" THEN 240              :REM*83
270 FLAG%(MACNUM)=0 : REM CANCEL DEF:REM*65
280 GOTO 470                        :REM*91
300 IF FLAG%(MACNUM)<>0 THEN PRINT M1$ : IN
   PUT B$ : IF LEFT$(B$,1)="Y" THEN 200
                                    :REM*91
320 FLAG%(MACNUM)=1                 :REM*61
330 MACRO$(MACNUM)=""               :REM*197
370 REM DEFINE MACRO STRING         :REM*207
390 PRINTM2$: INPUT COUNT            :REM*63
400 IF COUNT>20 THEN 390            :REM*177
420 FOR LOOP=1 TO COUNT             :REM*147
430 INPUT"DECIMAL VALUE ";DEC        :REM*43
440 MACRO$(MACNUM)=MACRO$(MACNUM)+CHR$(DEC)
                                    :REM*237
450 NEXT LOOP                        :REM*33
470 INPUT"FINISHED ALL DEFINITIONS (Y/N) ";
   B$                               :REM*249
480 IF LEFT$(B$,1)<>"Y" THEN 200     :REM*27
520 REM CREATE MACRO TABLE           :REM*96
540 PTR=4*4096 : REM CREATE MACRO TABLE AT
   THIS ADDRESS                     :REM*130
550 FOR ENTRY=0 TO 51               :REM*104
560 IF FLAG%(ENTRY)=0 THEN 750      :REM*112
580 REM CONVERT TO REVERSED SCREEN CODE VAL
   UE                               :REM*252
590 IF ENTRY<26 THEN CODE=ENTRY+1+128
                                    :REM*152
600 IF ENTRY>25 THEN CODE= ENTRY+39+128
                                    :REM*114
620 POKE PTR,CODE : REM 1ST BYTE OF 1 MACRO
    ENTRY IS SCREEN CODE VALUE      :REM*94
630 PTR=PTR+1 : REM NEXT TABLE BYTE :REM*46
650 POKE PTR,LEN(MACRO$(ENTRY))+2 : REM 2ND
    BYTE IS ENTRY LENGTH            :REM*192
660 PTR=PTR+1 : REM NEXT TABLE BYTE :REM*76
680 FOR ILOOP=1 TO LEN(MACRO$(ENTRY)) : REM
    REST OF 1 ENTRY IS MACRO STRING
                                    :REM*178
```

→

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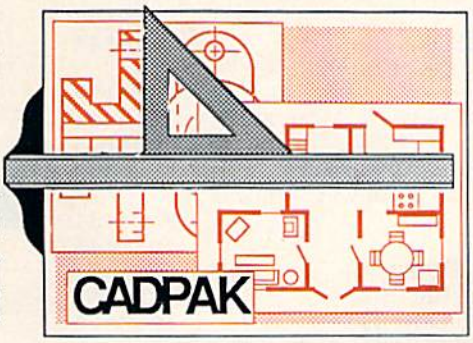

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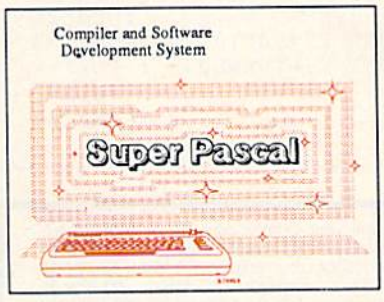

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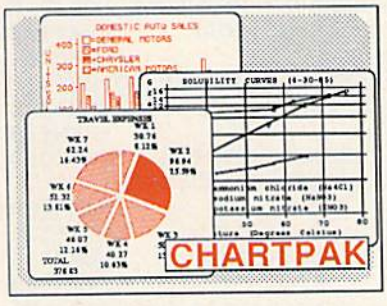

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Listing 1 continued.

```
69Ø POKE PTR,ASC(MID$(MACRO$(ENTRY),ILOOP,1
     ))                                  :REM*18
7ØØ PTR=PTR+1                            :REM*2ØØ
71Ø NEXT ILOOP                           :REM*198
73Ø IF PTR=>4*4Ø96+5ØØ THEN PRINT"{CRSR DN}
     MACRO TABLE TOO LARGE !!!" : STOP
                                         :REM*126
75Ø NEXT ENTRY                           :REM*21Ø
79Ø REM SAVE MACRO TABLE                 :REM*189
82Ø PRINT"{SHFT CLR}{2 CRSR DNs}8 - DISK
                                         :REM*87
83Ø PRINT"9 - DISK                       :REM*43
84Ø INPUT"SAVE TO DEVICE NUMBER ";DEV
                                         :REM*159
85Ø IF DEV<>1 AND DEV<>8 AND DEV<>9 THEN 84
     Ø                                   :REM*173
87Ø REM USE THE KERNAL SETLFS            :REM*63
88Ø POKE A,Ø : POKE X,DEV : POKE Y,Ø
                                         :REM*181
89Ø SYS 65466                            :REM*45
91Ø REM SETUP FILENAME                   :REM*251
92Ø B$="RUNSCRIPT MACROS"                :REM*35
93Ø FOR LOOP=1 TO LEN(B$)                :REM*25
94Ø POKE 849+LOOP,ASC(MID$(B$,LOOP,1))
                                         :REM*161
95Ø NEXT LOOP                            :REM*23
97Ø REM USE KERNAL SETNAM                :REM*85
98Ø POKE A,LEN(B$) : POKE X,85ØAND255 : POK
     E Y,85Ø/256                         :REM*31
99Ø SYS 65469                            :REM*17
1Ø1Ø REM USE KERNAL SAVE                 :REM*27
1Ø2Ø POKE 253,Ø : POKE 254,4*16          :REM*117
1Ø3Ø POKE A,253 : POKE X,PTRAND255 : POKE Y
     ,PTR/256                            :REM*2
1Ø4Ø SYS 65496                           :REM*132
1Ø7Ø END                                 :REM*52
111Ø REM INPUT SUBROUTINE                :REM*26
113Ø INPUT A$ : A$=LEFT$(A$,1)           :REM*16
115Ø IF A$="*" THEN RETURN               :REM*156
116Ø IF A$<"A" THEN 113Ø                 :REM*158
117Ø IF A$>"{SHFT Z}" THEN 113Ø          :REM*54
118Ø IF A$>"Z" AND A$<"{SHFT A}" THEN 113Ø
                                         :REM*3Ø
12ØØ IF A$<="Z" THEN MACNUM=ASC(A$)-65
                                         :REM*44
121Ø IF A$>="{SHFT A}" THEN MACNUM=ASC(A$)-
     167                                 :REM*56
123Ø RETURN                              :REM*12
```

Listing 2. *RUN Script Params program.*

```
1Ø REM SELECT DEFAULT PARAMETERS         :REM*38
4Ø REM SELECT SCREEN COLORS              :REM*14Ø
5Ø PRINTCHR$(147)"Ø{2 SPACEs}- BLACK"
                                         :REM*13Ø
6Ø PRINT"1{2 SPACEs}- WHITE"             :REM*26
7Ø PRINT"2{2 SPACEs}- RED"               :REM*162
8Ø PRINT"3{2 SPACEs}- CYAN"              :REM*22Ø
9Ø PRINT"4{2 SPACEs}- PURPLE"            :REM*84
1ØØ PRINT"5{2 SPACEs}- GREEN"            :REM*154
11Ø PRINT"6{2 SPACEs}- BLUE              :REM*192
12Ø PRINT"7{2 SPACEs}- YELLOW            :REM*212
13Ø PRINT"8{2 SPACEs}- ORANGE            :REM*8Ø
14Ø PRINT"9{2 SPACEs}- BROWN             :REM*226
15Ø PRINT"1Ø - LIGHT RED                 :REM*236
16Ø PRINT"11 - DARK GRAY                 :REM*216
17Ø PRINT"12 - MEDIUM GRAY               :REM*1Ø6
18Ø PRINT"13 - LIGHT GREEN               :REM*122
19Ø PRINT"14 - LIGHT BLUE                :REM*2Ø2
2ØØ PRINT"15 - LIGHT GRAY                :REM*164
22Ø PRINT                                :REM*66
23Ø INPUT"DEFAULT TEXT COLOR{3 CRSR RTs}Ø{3
     CRSR LFs}";COLR                     :REM*15Ø
24Ø POKE 6684,COLR                       :REM*54
25Ø INPUT"{CRSR UP}DEFAULT SCREEN COLOR{3 C
     RSR RTs}3{3 CRSR LFs}";COLR         :REM*122
26Ø POKE 6682,COLR                       :REM*2Ø1
27Ø INPUT"{CRSR UP}DEFAULT BORDER COLOR{3 C
     RSR RTs}6{3 CRSR LFs}";COLR         :REM*175
28Ø POKE 6683,COLR                       :REM*29
29Ø INPUT"{CRSR UP}DEFAULT STATUS LINE COLO
     R{3 CRSR RTs}6{3 CRSR LFs}";COLR
                                         :REM*189
3ØØ POKE 6685,COLR                       :REM*179
33Ø REM INPUT HIGH MEMORY LIMIT          :REM*135
34Ø PRINT : PRINT                        :REM*39
35Ø INPUT"{SHFT CLR}RUNSCRIPT'S HIGHEST ADD
     RESS{3 CRSR RTs}53247{7 CRSR LFs}";ADR
                                         :REM*151
36Ø ADR=ADR-256 : POKE 6691,(ADR/256-INT(AD
     R/256))*256 : POKE 6692,ADR/256:REM*187
39Ø REM SELECT DEFAULT SAVE DEVICE :REM*159
4ØØ PRINT : PRINT                        :REM*99
41Ø PRINT"ENTER THE DEVICE NUMBER OF YOUR M
     AIN"                                :REM*1Ø5
42Ø PRINT"DATA STORAGE DEVICE."          :REM*139
43Ø INPUT"DEFAULT SAVE DEVICE{3 CRSR RTs}8{
     3 CRSR LFs}";DEV : POKE 6686,DEV :REM*5
46Ø REM INPUT DEFAULT ASCII MODE         :REM*7
47Ø REM TRUE ASCII OR COMMODORE ASCII
                                         :REM*59
48Ø PRINT : PRINT                        :REM*179
49Ø PRINT"TRUE ASCII OR COMMODORE (NORMAL)
     ASCII?"                             :REM*29
5ØØ INPUT"SELECT TYPE (TRUE/NORMAL){3 CRSR
     RTs}NORMAL{8 CRSR LFs}";A$          :REM*73
```

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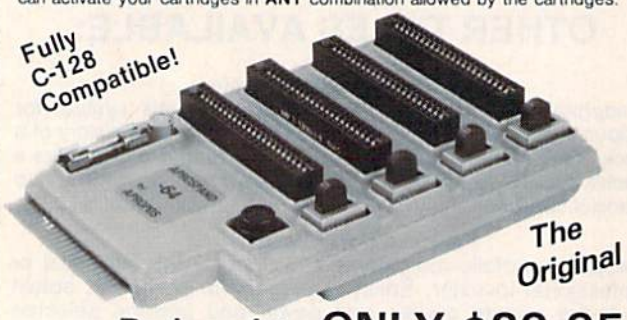

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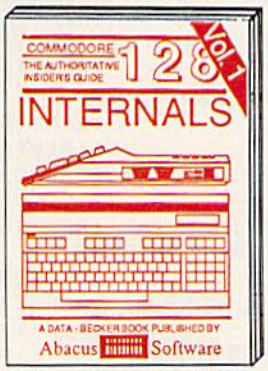

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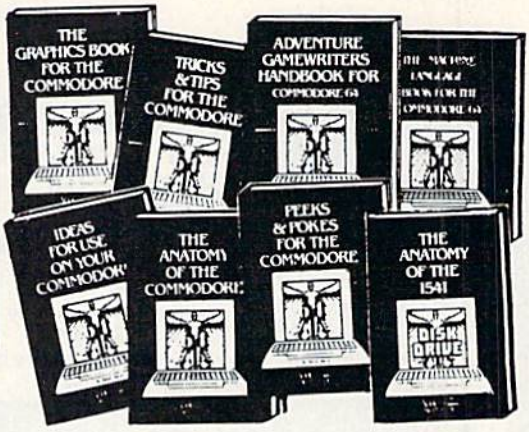
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Listing 2 continued.

```
51Ø IF LEFT$(A$,1)="T" THEN FLAG=255 : GOTO
     54Ø                                :REM*51
52Ø IF LEFT$(A$,1)="N" THEN FLAG=Ø : GOTO 5
    4Ø                                  :REM*6Ø
53Ø GOTO 48Ø                           :REM*1Ø2
54Ø POKE 6716,FLAG                     :REM*138
57Ø REM SELECT LINE FEED OR NO LINE FEED
                                       :REM*1Ø2
58Ø PRINT : PRINT                      :REM*24
59Ø PRINT"SHOULD A LINE FEED CHARACTER BE P
    RINTED AFTER EACH CARRIAGE RETURN ?"
                                       :REM*162
6ØØ INPUT"(Y/N){3 CRSR RTs}N{3 CRSR LFs}";A
    $                                  :REM*114
61Ø IF LEFT$(A$,1)="Y" THEN FLAG=255
                                       :REM*132
62Ø IF LEFT$(A$,1)="N" THEN FLAG=Ø : GOTO 6
    4Ø                                 :REM*34
63Ø GOTO 58Ø                           :REM*21Ø
64Ø POKE 6713,FLAG                     :REM*44
67Ø REM INPUT SECONDARY ADDRESSES      :REM*42
68Ø PRINT : PRINT                      :REM*124
69Ø PRINT"ENTER THE CORRECT SECONDARY ADDRE
    SS TO"                             :REM*1Ø6
7ØØ PRINT"CAUSE THE PRINTER TO PRINT IN "
                                       :REM*16
71Ø PRINT"UPPER/LOWER CASE."           :REM*216
72Ø INPUT"TEXT SECONDARY ADDRESS{3 CRSR RTs
    }7{3 CRSR LFs}";ADR                :REM*2ØØ
73Ø POKE 6693,ADR                      :REM*11Ø
74Ø PRINT                              :REM*76
75Ø PRINT"ENTER THE SECONDARY ADDRESS TO US
    E WHEN"                            :REM*16
76Ø PRINT"PROGRAMMING THE PRINTER WITH MACR
    O"                                 :REM*42
77Ø PRINT"STRINGS."                    :REM*51
78Ø INPUT"COMMAND SECONDARY ADDRESS{3 CRSR
    RTs}7{3 CRSR LFs}";ADR             :REM*125
79Ø POKE 6694,ADR                      :REM*237
82Ø REM SAVE RUNSCRIPT ML              :REM*55
83Ø PRINTCHR$(147);                    :REM*215
85Ø PRINT"8 - DISK"                    :REM*81
86Ø PRINT"9 - DISK"                    :REM*1Ø7
87Ø PRINT                              :REM*2Ø7
88Ø INPUT"SAVE TO WHICH DEVICE{3 CRSR RTs}8
    {3 CRSR LFs}";DEV                  :REM*149
89Ø IF DEV><1 AND DEV<>8 AND DEV<>9 THEN 83
    Ø                                  :REM*85
9ØØ POKE 78Ø,Ø : POKE 781,DEV : POKE 782,Ø
                                       :REM*115
91Ø SYS 65466 : REM SETLFS             :REM*31
93Ø PROG$="RUNSCRIPT"                  :REM*157
94Ø IF DEV<>1 THEN PROG$="Ø:"+PROG$:REM*115
95Ø FOR LOOP=1 TO LEN(PROG$)           :REM*121
96Ø POKE 849+LOOP,ASC(MID$(PROG$,LOOP,1))
                                       :REM*187
97Ø NEXT LOOP                          :REM*43
99Ø POKE 78Ø,LEN(PROG$) : POKE 781,85ØAND25
    5 : POKE 782,85Ø/256               :REM*57
1ØØØ SYS 65469 : REM SETNAM            :REM*243
1Ø2Ø ADR=12Ø48 : REM END OF RUNSCRIPT
                                       :REM*253
1Ø3Ø POKE 253,4681AND255 : POKE 254,4681/25
    6                                  :REM*192
1Ø4Ø POKE 78Ø,253 : POKE 781,ADRAND255 : PO
    KE 782,ADR/256                     :REM*248
1Ø5Ø SYS 65496 : REM SAVE              :REM*78
1Ø8Ø END                               :REM*62
```


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Shopper's Guide To CP/M Software

For those of you just starting to build your CP/M public domain library, here are four utilities you should add to your shopping list. They help you save disk space and take better advantage of your on-line time.

By CHERYL PETERSON

With thousands of CP/M public domain programs available, it's difficult to know which ones to acquire first. This article will describe some of the more important programs, explaining how they work and why they've become so popular. Most are available through public domain software vendors or from local electronic bulletin boards. (See "CP/M Treasure Trove," in *RUN*'s January 1986 issue.)

Squeeze and Unsqueeze

Two of the first programs you should look for are SQ.COM and USQ.COM. These programs have undergone several improvements, and each version gets a new version number tacked on. (The programs may have different names, such as SQEEZ, SQEZR or UNSQ.) In addition, some electronic bulletin boards put these programs into a library file. (More on library files later.)

SQ (called Squeeze) is a program that compresses data to create a much smaller file. Typically, this program reduces a file to about two-thirds of its original size. Phone transmission times for squeezed files are much less than for unsqueezed versions, so BBS users can save time (and long-distance phone charges) by learning to use SQ. CP/M bulletin boards use SQ to reduce the amount of disk space that programs occupy, and typical CP/M users can use it to minimize disk space for archival purposes.

By using SQ to compress datafiles that aren't being actively used, you can also save on the number of disks you buy. Because these files can't be modified without first unsqueezing them (using USQ), it isn't a good idea to squeeze files you use on a daily or weekly basis. But for business records or letters that you must keep on file for a specified period, compression can save a significant amount of disk space.

SQ is also good for use with backup files. Since they rarely have to be used, unsqueezing the few files you may need in case of a "crash" is a small inconvenience when you consider the disk space saved.

Because most electronic bulletin boards use SQ to save the limited disk space on their drives, you will notice that many of the programs have a "Q" as the next to the last letter in their name. This means that the program needs to be unsqueezed before you can run it.

Using SQ and USQ

Both of the programs are very easy to use. Despite this, I highly recommend getting a copy of the documentation and a complete description of how the programs work. (You should download .DOC files from the board.) Batch processing and other more involved uses of the programs are described there.

Since you'll probably be using it first, USQ gets first treatment. The more recent versions have a partial unsqueeze feature built in. This allows you to view the beginning lines of a file to confirm its identity. Type:

```
USQ-Z {filename1}
```

Z is the number of lines to be unsqueezed and can be up to 65,535. Filename1 is the name of the file to be unsqueezed.

If the file to be unsqueezed isn't on the default drive, you must use a drive specifier. If the -Z isn't used, then the program unsqueezes the entire file and writes it to disk for you. Be sure there is enough room for the new file; remember, the newly created file may be twice the size of the original.

SQ works much the same way as USQ. Type:

```
SQ {filename}
```

Multiple filenames may be used if you have several files to squeeze. Be sure there is enough room on the disk for the squeezed version.

Since SQ and USQ occupy about 38K of disk space, place them in the A drive and reserve the B drive for the programs with which you'll be working. This leaves more room on

XXX.BAS	An uncompiled Basic program.
XXX.C	Uncompiled C program.
XXX.PAS	An uncompiled Pascal program.
XXX.FOR	An uncompiled Forth program.
XXX.DOC	Document file for program XXX.
XXX.ASM	Source code for an unassembled program.
XXX.MAC	Source code to be assembled with a macro assembler.
XXX.COM	An assembled, ready-to-run program. Rarely downloadable.
XXX.OBJ	The downloadable, assembled, ready-to-run version of a program. You must change the program extender to .COM before running.
XXX.HEX	A hexadecimal file that can be loaded in and run.
XXX.MPM	Programs meant to run with MPM operating system (multi-user CP/M).
XXX.TXT	A text file that holds the documentation on a program or hardware system. Extender .HLP is also used in this way.
XXX.PIC	Usually a file that reveals a picture when printed.
XXX.CAL	Used for calendars.
XXX.DAT	Datafiles, frequently needed with other programs.
XXX.LBR	A library of files that, together, constitutes a working unit.
XXX.CAT	A catalog file.
XXX.DIR	Directory listings.
XXX.NEW	A file containing recent additions to a BBS.
XXX.UPD	Usually an updating listing of some sort.

Other files may be identified as REF (reference), FIX (bug or problem fix), MOD (modification), REV (revision), TBL (table), INF (information) or TIP (tip or hint). Months of the year may be identified by a three-letter extender.

Table 1. *CP/M filetypes and descriptions.*

the destination disk. In this case, use the A drive as the default and type the B-drive identifier before the names of the programs you're processing. The 1541 makes an excellent B drive. (Single disk drive owners will use E to designate the second drive, known as the "virtual" drive.)

SQ and USQ can also be used in Interactive mode. Use the same procedure as when using PIP. After the asterisk prompt, just type the name of the file you want processed. Entering a blank line and pressing the return key exits the program.

Another program that works in conjunction with SQ is the TYPESQ program. With it, you can type out text files that have been squeezed without unsqueezing them first. Output goes to your screen and pauses for keyboard input at the end of each page. In this way, you can move through a file page by page to be sure it has the information you want before deciding to use unsqueeze.

LU and LRUN

When downloading files from a remote bulletin board system, it is important to get all the parts of a package. Some programs require special datafiles and multiple modules before they will run. To simplify downloading these types of programs and to save disk space, a program called LU (library utility) is used to bind the appropriate files together into one.

Disk space is usually gained when several related files are put into a library. This is because CP/M has a minimum allocation of space per file. These are usually 1K or 2K blocks. Though only part of a block at the end of a file is used, the remaining empty space is still assigned to that file and can't be used by any other file. This wasted space can be recovered by putting several files into a library. Although the library directory occupies some disk space, you won't use as much if you combine multiple files.

LU has a variety of commands available once it is running. Typing LU puts you into the Interactive mode of the program; you'll then see a -?>, which means the program is looking for a command.

The valid commands are:
-a—adds files to library.
-d—deletes files from library.
-e—extracts files from library.
-l—lists current library map.
-o—opens a library.
-r—reorganizes a library.

When you type in the command you want to execute, the ? prompt is changed to any letter you choose, signifying the program is waiting to process the filename. The exceptions are the -l and -r commands.

The -l command prints out the names and locations of all files in the currently open library. The -r command sorts the files into alphabetical order and releases unused file space.

The command you will most likely use is the -e command, which removes the specified file from the library, so you can run it. Before you can do that, though, you need to know the names of the files in the library. Use the -l command to list them.

If you've downloaded a library from an electronic BBS, I recommend you first extract the document file that describes the library. This should let you know whether or not you need to extract all the library files. Since a program running inside a library file can't access other files in the library, you may have to extract all the files before running the program. On the other hand, programs like SQ and USQ can be run while still in the library by using LRUN. (More on that later.)

To extract a file from a library, you must first open the library with the -o command. Type LU (with a drive identifier if it isn't on the default drive). At the -?> prompt, type -o to get the -O> prompt. Then type the name of the file you want to open. Once you've opened the library, any subsequent commands will be assumed to apply to that library.

To extract a file, use the -e command to get the -E> prompt. Type in a drive identifier if you want the file written to a disk other than the default one. Follow this with the filename of the library entry you want extracted. Wild cards (* and ?) can be used to remove several entries at once. The -E> prompt remains after each extraction.

After extracting a number of files, it's a good idea to use the -r command to reorganize the library and recover the freed disk space. Entering the -r command will start the procedure. If you follow the -r with a 1, the reorganization will reset the number of directory entries to exactly the number of files left in the library, thereby recovering some of the space occupied by the directory.

There's no specific command to close the library; simply enter a blank line at any prompt. Opening a new library will also close the active library.

Modifying a Library

If you have a group of files to put into a library, use the -o command to open the library. If you don't

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specify a name, the default (LIBRARY.LBR) will be used. When you open a new library, you must specify the number of directory entries. It's best to plan for more entries than you have, just in case you want to add some later. However, the -r command can be used to add entries later, if you want to save disk space.

Once you've created a library, you can add members to it by using the -a command. Type -a to change the prompt to -A>. Now each filename you type will be added to the library. You can use wild cards. Be sure your number of files doesn't exceed your directory space.

To remove files from the library, use the -d command. It works much the same way as -a. However, keep in mind the following. During a work session, a copy of the directory for the active library is created on disk. When you delete files from the library, they are actually deleted from the *copy directory*. They aren't actually deleted until the library is closed. If you discover an error before closing the library, you can use a ↑C (CTRL C) to escape from LU without deleting those files.

Also, although the files are deleted from the library directory, the disk space they occupied is retained until you reorganize the directory.

LRUN

The LRUN program can also be used to run a program that is inside a library. Use:

```
LRUN [lbrname.lbr] [progname.com]
  [parameters]
```

The lbrname.lbr is the name of the library that contains the program to run; progname.com is the program to run; and parameters is a group of filenames or other information that the program needs in order to run. For instance,

```
LRUN COMMAND.LBR X.COM B:
```

would run the program X.COM (extended directory) found in library COMMAND.LBR. The B: would cause X.COM to list all the files on the B drive, their size, the amount of disk space used, the amount of free space left, the number of files on the disk and the number of unused directory positions. If the B: were omitted, the information would come from the default drive.

Who to Thank

You might want to thank the authors of SQ and USQ and LU and LRUN for their efforts. The author of SQ and USQ is Dick Greenlaw (251 Colony Court, Gahanna, OH 43230). You can reach him by phone evenings and weekends at 614-475-0172. The author of LU and LRUN is Gary Novosielski (21 W. Pierrepont Ave., Rutherford, NJ 07070). You can reach him by phone at 201-935-4087.

Please keep in mind that these folks don't market the programs, so you'll have to acquire them through the usual channels. It never hurts to let programmers know that their efforts are appreciated, though. Most of them donate their programs in hopes that others will benefit from them, and I've never encountered a programmer who resented a little public or private recognition.

Although these programs are in the public domain, you should be aware that their authors do have copyright notices on the programs. These notices prohibit the commercial sale of the programs or their documentation.

File-Naming Conventions

A word about file-naming conventions. As mentioned earlier, squeezed files have a Q as the next to the last letter. Many BBSs use the first eight letters to name the program and the last three letters to indicate the type of program. Table 1 provides you with some examples of what you can expect. XXX indicates the name of the file. R

Editor's Note:

As many of you have probably gathered, the original version of CP/M packaged with your C-128 does not support the RS-232 port. Commodore has now revised the CP/M operating system to allow the use of the RS-232 port directly from CP/M mode. At the time of this writing, Commodore had not publicized how you can obtain this new version. However, updates are available on major networks such as Viewtron, CompuServe and QuantumLink, and it has been unofficially stated that Commodore will provide the update to all registered C-128 owners.

Address all author correspondence to Cheryl Peterson, 750 85th St., #3, Miami Beach, FL 33141.

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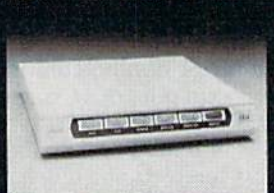

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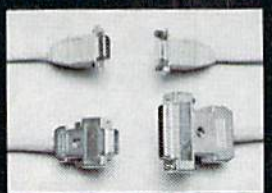

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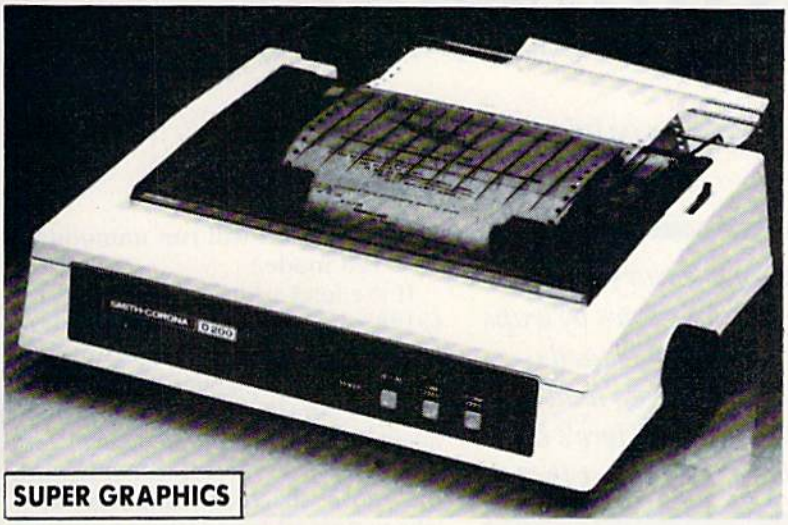

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By DAVID DARUS and LOUIS WALLACE

As your library of C-128 programs grows by leaps and bounds, you'll need a quick and easy way to load and run all of them. Here's a program that does just that.

The C-128 AutoMenu is designed to make it easy for you to load and run programs on the C-128. It allows you to quickly and easily look through a disk's available program files and load and run them by simply pressing a key.

After carefully typing in Listing 1, save it to disk. You can save C-128 AutoMenu to any of your frequently used disks to save time later. In fact, by using the C-128's autoboot capability, you can set up each C-128 disk so that AutoMenu is automatically booted at powerup. (For a program that allows you to make self-booting program disks, see "Disk Commands on the C-128" in *RUN*'s December 1985 issue.)

When you run or autoboot C-128 AutoMenu, it first checks to see if you are in 40- or 80-column mode, then formats its output accordingly. It will go to the disk for a minute and read in all the names and sizes of the program files on the disk. It will ignore sequential, user and relative files, since they are not executable programs.

Once the program names are in memory, it will list them in a window on the screen, with the program size on the far-right side of the window. You can use your cursor keys to move up or down through the list while highlighting the program name under the cursor. If you wish, you can return to the top of the list by pressing the clr/home key.

Once you've found the program you want, simply press the return key while the cursor is on the program name, and your choice will be loaded and run if it is a C-128-compatible Basic program.

AutoMenu checks the load address of the file you choose; if the address isn't correct for a C-128 Basic program, AutoMenu compares it to the load address for C-64 Basic programs. If AutoMenu finds that the program loads at 2049 decimal, which is where the C-64 Basic programs start, it tells you that this may be a C-64 program and asks if you still wish to load and run it. If you reply yes, it will load it to the proper start of Basic for the C-128 and run it. (Note: Not all C-64 Basic programs will run unmodified in C-128 mode.)

If the load address is incorrect for C-128 or C-64 Basic, AutoMenu assumes the program is in machine language and asks if you wish to boot the program. Booting allows machine language programs to be loaded and activated all at once. It will only work on those machine language files whose start address is the same as the load address. In other words, if the load address is 32768, booting will load it to 32768 and attempt to start it with a SYS 32768. Machine language files that require starting from an address different from the load address cannot be executed this way.

If the program you want is not on the disk you're viewing, simply remove the current disk from the drive (do not remove a disk while the drive is spinning) and insert another disk. Then press the stop key. AutoMenu will load the directory of the new disk and display it for you.

Well, that's all there is to it. You'll find this program will add new dimensions to the use of your disk directory. R

Address all author correspondence to David Darus and Louis Wallace, 6124B SW 11th Place, Gainesville, FL 32607.

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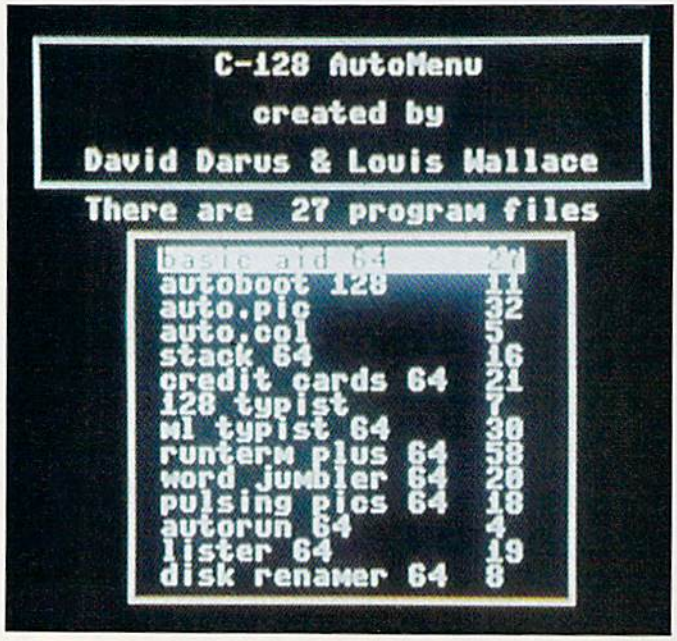

AutoMenu screen display.

Listing 1. *AutoMenu program.*

```
10 REM C-128 AUTOMENU                    :REM*116
20 REM DAVID DARUS & LOUIS WALLACE       :REM*70
30 REM (C)1985 RUN MAGAZINE              :REM*218
40 COLOR4,1:FAST                         :REM*134
50 REM READ IN DIRECTORY                 :REM*64
60 GRAPHIC1,1:CLR:PRINT"{SHFT CLR}";CHR$(8)
   ;CHR$(14);                            :REM*98
70 TRAP760                               :REM*202
80 A$=" ":L=32                           :REM*92
90 IFLEN(A$)<LTHENA$=A$+LEFT$(A$,L-LEN(A$))
   :GOTO90                               :REM*84
100 BANK0:FORDA=0TO65:READ DT:POKE7168+DA,D
   T:NEXT:BANK15                         :REM*82
110 DR=7168:F=0:DIM F$(145):GOSUB540     :REM*0
120 DCLEAR:IF DS THEN PRINTDS;DS$:END
                                         :REM*212
130 OPEN1,8,15:OPEN2,8,2,"#":T=18:S=1
                                         :REM*198
140 PRINT#1,"U1";2;0;T;S:PRINT#1,"B-P:"2;0
                                         :REM*62
150 FORR=0TO7:SYS DR                     :REM*66
160 IFR=0THENT=ASC(MID$(A$,1,1)):S=ASC(MID$
   (A$,2,1))                             :REM*4
170 FT=ASC(MID$(A$,3,1))                 :REM*58
180 IF FT=130 THEN F=F+1:BK=ASC(MID$(A$,31,
   1))+ASC(MID$(A$,32,1))*256:F$(F)=MID$(A
   $,6,16)+STR$(BK)                      :REM*122
190 NEXT:IF T GOTO140                    :REM*106
200 CLOSE2:CLOSE1                        :REM*224
210 CHAR1,0+MD/2,7,"{40 SPACEs}"         :REM*86
220 REM BEGIN SELECTION                  :REM*34
230 CHAR1,8+MD/2,8,"{CTRL 8}{COMD A}{22 SHF
   T *s}{COMD S}"                        :REM*196
240 FORT=9TO22:CHAR1,8+MD/2,T,"{SHFT -}{22
   SPACEs}{SHFT -}":NEXT                 :REM*188
250 CHAR1,8+MD/2,23,"{COMD Z}{22 SHFT *s}{C
   OMD X}"                               :REM*34
260 CHAR1,6+MD/2,7,"{CTRL 6}{SHFT T}HERE AR
   E{CTRL 3}":CHAR1,16+MD/2,7,STR$(F)+"{CT
   RL 6} PROGRAM FILES"                  :REM*59
270 WINDOW9+MD/2,9,30+MD/2,22:COLOR5,15
                                         :REM*1
280 FORCP=1TO14:MS$=F$(CP):GOSUB740:NEXT:CF
   =1:CP=1                               :REM*151
290 MS$="{CTRL 2}{CTRL 9}"+F$(CF)+"{CTRL 0}
   {COMD 7}":GOSUB740                    :REM*65
300 GETKEY A$:MS$=F$(CF):GOSUB740        :REM*251
310 IFA$="{CRSR DN}"THEN:IFCF+1<=FTHENCF=CF
   +1:CP=CP+1:IFCP>14THENCP=14:PRINTCHR$(2
   7)+"V";:MS$=F$(CF):GOSUB740           :REM*129
320 IFA$="{CRSR UP}"THEN:IFCF-1>0THENCF=CF-
   1:CP=CP-1:IFCP<1THENCP=1:PRINTCHR$(27)+
   "W":MS$=F$(CF):GOSUB740               :REM*57
330 IF A$="{HOME}" OR A$="{SHFT CLR}"THENPR
   INT"{SHFT CLR}":GOTO280               :REM*189
340 IFA$=CHR$(13)THEN360                 :REM*171
350 GOTO290                              :REM*177
360 MS$="{CTRL 6}{CTRL 9}"+F$(CF)+"{CTRL 0}
   {COMD 7}":GOSUB740                    :REM*21
370 PRINT"{2 HOMEs}":GRAPHIC CLR         :REM*61
380 F$=LEFT$(F$(CF),16)                  :REM*139
390 OPEN2,8,2,F$+",P,R"                  :REM*141
400 GET#2,A$:GET#2,B$:LA=ASC(A$+CHR$(0))+AS
   C(B$+CHR$(0))*256:CLOSE2              :REM*101
410 IF LA=7169 OR LA=16385 THEN CHAR1,0,24,
   "{SHFT L}OADING "+F$:RUN(F$)          :REM*45
420 IF LA=2049 THEN CHAR1,0+MD/2,24,"{SHFT
   M}AY BE A {SHFT C}-64 {SHFT B}{SHFT A}{
   SHFT S}{SHFT I}{SHFT C} PROGRAM. {SHFT
   R}UN (Y/N)?":GOTO490                  :REM*141
```


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Listing 1 continued.

```
43Ø CHAR1,3+MD/2,24,"{SHFT N}OT A {SHFT B}{
    SHFT A}{SHFT S}{SHFT I}{SHFT C} PROGRAM
    .{2 SPACEs}{SHFT B}OOT (Y/N)?"  :REM*45
44Ø GETKEY A$                       :REM*167
45Ø CHAR1,Ø+MD/2,24,"{39 SPACEs}"   :REM*125
46Ø WINDOW9+MD/2,9,3Ø+MD/2,22:COLOR5,15
                                    :REM*191
47Ø IFA$<>"Y"THENPRINT"{SHFT CLR}":GOTO28Ø
                                    :REM*215
48Ø CHAR1,Ø,24,"{SHFT B}OOTING "+F$:BOOT(F$
    )                               :REM*21
49Ø GETKEY A$                       :REM*217
5ØØ CHAR1,Ø+MD/2,24,"{39 SPACEs}"   :REM*175
51Ø WINDOW9+MD/2,9,3Ø+MD/2,22:COLOR5,15
                                    :REM*241
52Ø IF A$<>"Y"THENPRINT"{SHFT CLR}":GOTO28Ø
                                    :REM*1Ø
53Ø RUN(F$)                         :REM*178
54Ø REM DRAW TITLE SCREEN           :REM*2Ø8
55Ø X1=13:X2=15:X3=6                :REM*2Ø2
56Ø MD=PEEK(215):REM 4Ø/8Ø COL. FLAG
                                    :REM*152
57Ø GRAPHICØ:ML=4Ø:CT$="{18 CRSR RTs}":COLO
    RØ,1:COLOR4,1:IFMD=ØTHENSLOW    :REM*1Ø6
58Ø IF MD<>Ø THEN MD=4Ø:CT$=CT$+CT$+" ":ML=
    8Ø:GRAPHIC5:COLOR6,1:X1=33:X2=35:X3=26
                                    :REM*38
59Ø COLOR5,4                        :REM*226
6ØØ MS$="{COMD A}{31 SHFT *s}{COMD S}":GOSU
    B72Ø                            :REM*74
61Ø MS$="{SHFT -}{31 SPACEs}{SHFT -}":GOSUB
    72Ø                             :REM*2Ø8
62Ø MS$="{SHFT -}{31 SPACEs}{SHFT -}":GOSUB
    72Ø                             :REM*218
63Ø MS$="{SHFT -}{31 SPACEs}{SHFT -}":GOSUB
    72Ø                             :REM*228
64Ø MS$="{SHFT -}{31 SPACEs}{SHFT -}":GOSUB
    72Ø                             :REM*238
65Ø MS$="{SHFT -}{31 SPACEs}{SHFT -}":GOSUB
    72Ø                             :REM*248
66Ø MS$="{COMD Z}{31 SHFT *s}{COMD X}":GOSU
    B72Ø                            :REM*138
67Ø COLOR5,8:CHAR1,X1,1,"{SHFT C}-128 {SHFT
     A}UTO{SHFT M}ENU"              :REM*174
68Ø COLOR5,9:CHAR1,X2,3,"CREATED BY":REM*52
69Ø COLOR5,3:CHAR1,X3,5,"{SHFT D}AVID {SHFT
     D}ARUS & {SHFT L}OUIS {SHFT W}ALLACE"
                                    :REM*2Ø2
7ØØ COLOR5,5:CHAR1,4+MD/2,7,"{SHFT R}EADING
     DIRECTORY... {SHFT P}LEASE WAIT"
                                    :REM*2Ø4
71Ø RETURN                            :REM*2
72Ø REM PRINT STRING CENTERED       :REM*232
73Ø PRINTLEFT$(CT$,(ML-LEN(MS$))/2);MS$:RET
    URN                             :REM*96
74Ø CHAR1,1,CP-1,MS$:RETURN         :REM*76
75Ø REM TRAP IT                     :REM*42
76Ø PRINT"{2 HOMEs}{SHFT CLR}":CLR:RUN
                                    :REM*172
77Ø DATA16Ø,3,165,47,133,252,165,48 :REM*59
78Ø DATA133,253,169,252,162,1,32,116
                                    :REM*149
79Ø DATA255,133,25Ø,2ØØ,169,252,162,1
                                    :REM*81
8ØØ DATA32,116,255,133,251,162,2,32 :REM*71
81Ø DATA198,255,16Ø,Ø,32,228,255,162
                                    :REM*113
82Ø DATA25Ø,142,185,2,162,1,32,119 :REM*233
83Ø DATA255,2ØØ,192,32,2Ø8,238,76,2Ø4
                                    :REM*155
84Ø DATA255,32,32,32,32,32,32,32      :REM*9
85Ø DATA219,219                     :REM*251
```


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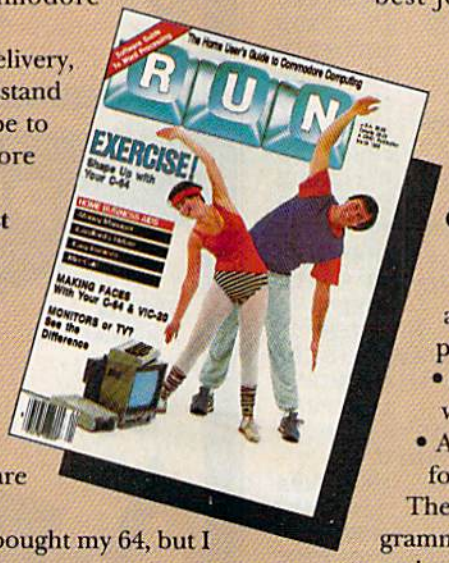
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Auto Menu

Simplify disk operations by loading programs with a single keystroke.

By JOE W. ROCKE

Auto Menu is a disk-based utility that takes the hassle out of loading a program. The Load and Run commands become a menu-driven operation. With a single keystroke, you select the program to be loaded. Your C-64 then takes over, automatically loading and running the selection. Even the most inexperienced newcomer can load a program.

The C-64 wedge and similar utilities provide shortcuts in typing the Load command. However, it's still up to you to remember and correctly type the program name. Everyone who uses a disk system has been confronted with a File Not Found message because of a typing error. Most of us have to load and read the disk directory unless a crib sheet of program names is handy.

Simplified Operation

Auto Menu lists the disk directory in menu format. The disk directory is read automatically and listed in double-column form, which prevents all but the longest listing from scrolling off the screen.

Each filename is preceded by a letter that is assigned by Auto Menu. The letter serves as an identifier for program selection, and filenames are listed in the order the programs are stored on the disk. To load a program, press its filename's corresponding letter. This will also clear the screen and display a loading message. A typical message display is as follows:

```
LOAD "PROGRAM NAM*",8,1
SEARCHING FOR PROGRAM NAM*
LOADING
```

No further keyboard input is necessary after the initial menu selection. The loading operation takes place automatically, and, upon its completion, the computer automatically initiates a Run command. Finally, the menu program is removed from memory with a New command.

To facilitate the auto-run operation, the asterisk (*) pattern-matching format is used in Auto Menu's loading instruction, as described in the 1541 user's guide. Pattern matching simply means that the drive will load the first program that has a name matching the letters in the Load instruction. In this program, the first 12 letters of program names are used. As it's unlikely that a disk will have two programs with the same name, this pattern-matching format should not pose a problem.

The Auto Menu listing is not difficult to follow, as there is a minimum of branching within the program flow. Lines 10–120 set up the header screen that is used to display the user prompts. A black background provides good contrast for C-64 systems using a TV as a monitor.

Reading the Directory

Lines 130–260 contain the disk directory read routine. The directory is read as a sequential file using the GET# statement. The disk name, file block numbers and program type are skipped, for this information is not needed. Filename characters are read one at a time and concatenated for storage in variable N$ (line 180). Conditional statements in lines 160 and 190 cause quotes and embedded spaces in the normal directory listing to be skipped.

Files not considered a normal part of the menu are skipped by conditional statements in lines 200–210. For example, if the disk contained an automatic loader called Boot, there would be no need to load the program a second time. It is also unnecessary to load the menu file a second time. Therefore, these two files are excluded from the menu list. Similar conditional statements could be added to skip the listing of sequential files.

Line 250 checks status variable ST, which, if 0, indicates the end of the filename stored in the disk directory. The name string that is temporarily stored in variable N$ is transferred to subscripted variable N$(F) for later recall. Counter variable F is

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then incremented, and program flow loops back to line 140 to read the next filename.

If status variable ST is not 0, program flow jumps to line 260. At this point, the file is closed and disk operation ceases.

Menu Display

The directory read routine stores all disk filenames in subscripted variable N$(F). The stored names are recalled for display by using a Print statement in a For. . . Next loop. The filenames are displayed in double-column format because a long list of names would scroll off the screen. This double column is accomplished by lines 270–300.

Line 270 sets up the first column by limiting the loop count to half of counter variable F. The CHR$(E + 64) in the Print statement provides the identifying letter for each filename stored in subscripted variable N$(E).

Line 280 returns the cursor to the home position and uses POKE 214,8 to reposition the cursor to print the second column of names. The loop in line 290 displays the last half of the names, printing them at SPC(20) to form the double-column display.

Lines 310–320 reposition the cursor and print the prompts in the screen header.

Lines 330–350 use the Get statement to scan the keyboard for an input. Line 350 limits keyboard input to the range of letters in the filename menu listing. A wrong keypress is ignored and sends program flow back to line 330 to continue the keyboard scan.

Line 360 reads the ASCII value of the key pressed and subtracts 64 from the number. For example, the ASCII value of letter B is 66. Subtracting 64 from 66 leaves 2. The result is stored in variable P for use in identifying the program identified by letter B. If you were to print N$(P)—i.e., N$(2)—you would see the second filename that was read from the directory.

Line 370 checks to see if filename N$(P) is longer than 12 characters. A long filename is shortened to the first 12 characters and the pattern-matching asterisk is added to the name string.

Line 380 sets up the filename for the Load command in line 390. The MID$ function is used to strip a space character from the filename. The Load command is then printed (line 390) in normal command format. (Note how CHR$(34) is used to provide the quotes necessary in a Load command.)

The filename in quotes is followed by the device and command numbers in standard format. Command number 1 is added after the device number, so both Basic and machine code programs will load correctly.

Line 490 sets up variable A$ for automatic execution of the program loaded. The CHR$(13) is added to variable A$ to provide the equivalent of pressing the return key. Including A$ in a program statement causes the function to be executed, just as if you had pressed the return key.

Line 500 is the key to the automatic run operation. The Pokes in the line cause the computer to enter its own instructions! Line 500 represents a "dynamic keyboard" technique, whereby the computer performs functions normally requiring keyboard input. When this line is executed, the computer executes a Run command. The CHR$(13) in variable A$ forces a RETURN in the keyboard buffer and executes the instructions.

If you have an early C-64, line 500 may not work properly because of changes made in later ROM (read only memory) versions. Try substituting POKE 527 or 528 for POKE 631 and POKE 525 for Poke 198.

Line 510 erases the menu program from memory with a New command. This line is executed last, with the word NEW appearing momentarily on the screen.

System Calls

Lines 400–480 explain the statements required to automatically run a machine-code program that is initiated by a system call. It will be necessary to insert lines similar to the examples in lines 460–480 to reflect machine-code programs you may have on the disk.

The conditional statement at the beginning of each line provides a means of distinguishing between Basic and machine-code programs. By assigning to variable A$ the SYS syntax followed by the call address, the call can be initiated by line 500.

You may use the pattern-matching asterisk in machine-code program names just as it is used in line 370. In setting up the LEFT$ function, you may set the number of name characters as desired. The lines included in the listing are for example only.

Auto Boot

That's all there is to it! Type in Listing 1 and save Auto Menu on each of your disks. When you want to use it, load and run it. The automated operation sure beats typing in loading commands! R

Address all author correspondence to Joe W. Rocke, 224 W. Benson, Ridgecrest, CA 93555.

Listing 1. *Auto Menu program.*

```
1 REM ********************************
                                    :REM*145
2 REM *{9 SPACEs}'AUTO MENU'{11 SPACEs}*
READY.                              :REM*226
3 REM * READS DIRECTORY & AUTO LOADS{2 SPAC
  Es}*                              :REM*129
4 REM * PROGRAM SELECTED BY THE USER{2 SPAC
  Es}*                              :REM*238
5 REM *{13 SPACEs}BY{16 SPACEs}*    :REM*111
6 REM * JOE W. ROCKE{1Ø SPACEs}7/27/84 *
                                    :REM*182
7 REM ********************************
                                    :REM*151
1Ø POKE5328Ø,Ø:POKE53281,Ø          :REM*142
2Ø DIM N$(1ØØ):CX=54272:PRINT "{SHFT CLR}"
                                    :REM*34
3Ø PRINT"{SHFT CLR}{COMD 1}{CRSR DN}"
                                    :REM*86
4Ø X$="{CTRL 9}{39 SPACEs}"         :REM*32
5Ø FORX=1TO5:PRINTX$:NEXT          :REM*246
6Ø PRINT"{HOME}{CTRL 6}":PRINT CHR$(117);
                                    :REM*134
7Ø FOR X=1 TO 38:PRINTCHR$(1ØØ);:NEXT
                                    :REM*22Ø
8Ø PRINTCHR$(1Ø5);:FOR X=1 TO 5     :REM*134
9Ø PRINTCHR$(1Ø3)SPC(38)CHR$(1Ø4)" "CHR$(15
   7);:NEXT                         :REM*118
1ØØ PRINTCHR$(1Ø6);:FOR X=1 TO 38:PRINTCHR$
    (1Ø2);:NEXT:PRINTCHR$(1Ø7)      :REM*182
11Ø PRINT"{HOME}"TAB(14)"{CTRL 9}{3 CRSR DN
    s}* AUTO MENU *"                :REM*124
12Ø PRINTTAB(12)"{CTRL 8}READING DIRECTORY"
                                    :REM*32
```

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```
        * AUTO MENU *

      PRESS LETTER KEY

  TO AUTO LOAD PROGRAM SELECTED

A  SKI              K  SCRAMBLER
B  HASSLE CASTLE    L  TAG
D  SNAKES           N  TAX LDR
E  SHELL GAME       O  TAXMAN
F  BUGS             P  FINDWORD
G  TRAP SHOOT       Q  MYSTERY
H  SHUFFLE          R  BATTLESHIP
I  LAVA PIT         S  SYMBOL
J  MAD ADDER        T  ZELAZ
```

Listing 1 continued.

```
129 REM --- READ DISK DIRECTORY ---:REM*145
13Ø OPEN1,8,Ø,"$"                  :REM*138
14Ø GET#1,B$:IFST<>ØTHEN26Ø        :REM*9Ø
149 REM --- LINE 15Ø LIMITS TO 26 FILES ---
                                   :REM*93
15Ø IFF>=27THEN26Ø                 :REM*246
16Ø IFB$<>CHR$(34)THEN14Ø          :REM*86
17Ø N$="":PRINT"{HOME}":POKE 214,8:PRINT
                                   :REM*234
18Ø GET#1,B$:IFB$<>CHR$(34)THENN$=N$+B$:GOT
    O18Ø                           :REM*84
19Ø GET#1,B$:IFB$=CHR$(32)THEN19Ø  :REM*38
199 REM -- FOLLOWING LINES SKIP THE LOADING
     FILES --                      :REM*133
2ØØ IFN$="BOOT"THENF=F-1:GOTO24Ø    :REM*6
21Ø IFN$="AUTO MENU"THENF=F-1:GOTO24Ø
                                   :REM*2Ø8
22Ø IFLEFT$(N$,1)=" "THENF=F-1:GOTO24Ø
                                   :REM*146
23Ø N$(F)=" "+N$                   :REM*216
24Ø GET#1,B$:IFB$<>""THEN24Ø       :REM*18Ø
25Ø IFST=ØTHENF=F+1:GOTO14Ø        :REM*68
26Ø CLOSE1                         :REM*17
269 REM - PRINT FIRST COLUMN OF NAMES -
                                   :REM*11Ø
27Ø FORE=1TOF/2:PRINT"{COMD 6}"CHR$(64+E)"{
    CTRL 2}"N$(E):NEXT             :REM*127
28Ø PRINT"{HOME}":POKE214,8:PRINT  :REM*89
289 REM -- THEN 2ND COLUMN OF NAMES ---
                                   :REM*236
29Ø FORE=F/2+1TOF:PRINTSPC(2Ø)"{COMD 6}"CHR
    $(64+E)"{CTRL 2}"N$(E):NEXT    :REM*115
3ØØ PRINT"{HOME}{3 CRSR DNs}"      :REM*231
31Ø PRINTTAB(12)"{CTRL 8} PRESS LETTER KEY
    "                              :REM*1Ø1
32Ø PRINTTAB(5)"TO AUTO LOAD PROGRAM SELECT
    ED"                            :REM*35
33Ø GETM$:IFM$=""THEN 33Ø          :REM*53
34Ø IFM$=CHR$(13)THENRUN           :REM*173
35Ø IFM$<"A"ORM$>CHR$(64+F)THEN33Ø :REM*159
36Ø P=ASC(M$)-64:PRINT"{SHFT CLR}{HOME}{3 C
    RSR DNs}"                      :REM*99
37Ø IFLEN(N$(P))>12THENN$(P)=LEFT$(N$(P),12
    )+"*"                          :REM*145
38Ø N$(P)=MID$(N$(P),2,LEN(N$(P)))  :REM*1
39Ø PRINT"LOAD"CHR$(34)N$(P)CHR$(34)",8,1{3
     CRSR UPs}"                    :REM*159
4ØØ REM ******************************
                                   :REM*39
41Ø REM * IF YOU KNOW THE PGM IS 'ML' *
                                   :REM*71
42Ø REM * THE EXAMPLE BELOW WILL LOAD *
                                   :REM*57
43Ø REM * AND FILE & RUN IT. EXAMPLES *
                                   :REM*153
44Ø REM * (3) ARE SHOWN BELOW.{8 SPACEs}*
                                   :REM*25
45Ø REM ******************************
                                   :REM*89
46Ø IFLEFT$(N$(P),4)="TOOL"THENA$="SYS64738
    "+CHR$(13):GOTO5ØØ             :REM*159
47Ø IFLEFT$(N$(P),6)="SPRITE"THENA$="SYS491
    52"+CHR$(13):GOTO5ØØ           :REM*225
48Ø IFLEFT$(N$(P),5)="ULTRA"THENA$="SYS4915
    2"+CHR$(13):GOTO5ØØ            :REM*157
49Ø A$="RUN"+CHR$(13)              :REM*67
5ØØ POKE631,13:FORB=1TOLEN(A$):POKE631+B,AS
    C(MID$(A$,B,1)):NEXT:POKE198,1Ø:REM*119
51Ø NEW                            :REM*137
```


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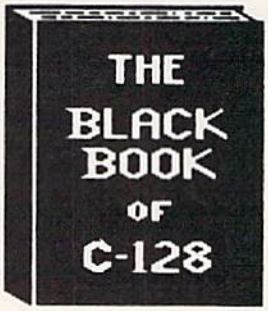

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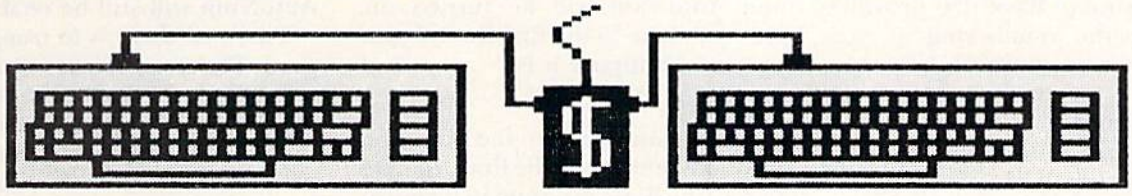

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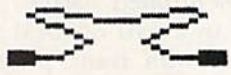

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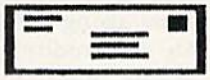

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By MICHAEL BROUSSARD

The AutoNum program adds a new command to Basic that provides automatic line numbering as you type. Written in machine language, AutoNum is in the form of a Basic loader (Listing 1), which you must carefully type in. Be sure you save it before running it, as the program Pokes the machine language into upper RAM and then deletes itself.

Using AutoNum is easy. Each time you turn on (or reset) your Commodore, you must first load and run the AutoNum loader. The loader clears the screen and prints a message to let you know it is initializing. It then Pokes a Basic wedge into a place in RAM where it won't interfere with the Basic program you are entering. (How this wedge works is explained later.) After a few seconds, the loader prints the following set of abbreviated instructions:

```
TO ENABLE, TYPE:
  AUTO <increment>
TO DISABLE, TYPE:
  AUTO
```

Finally, the loader clears memory, and you are ready to start typing your program. Suppose you wish to number your program by tens. Simply type in:

```
AUTO 10
```

and press the return key. You will get a Ready message back from Basic, and AutoNum will be turned on. Now you type in the first line of your program. Suppose it is:

```
100 PRINT
```

When you type in the line and press the return key, the line becomes part of the Basic program in memory, as usual. In addition, AutoNum prints the next line number:

```
110
```

The cursor is then positioned so that you are ready to type in the next program line.

Continue entering program lines in this fashion until you have typed in the whole program or until you want to enter a direct command, like Save. To perform the latter, simply backspace over the line number AutoNum printed and then type in your direct command. Or you can simply press the return key after the next AutoNum line number. Either action will disable AutoNum until you type in another line beginning with a line number. Then AutoNum will step in and start printing line numbers again, continuing from the new line number.

To turn off AutoNum completely, simply type:

```
AUTO
```

in Direct mode. (If you type this command next to a line number and press the return key, you will add an unwanted line to your program and AutoNum will still be enabled.)

That's all there is to using the program. The rest of this article is directed toward more advanced programmers and tells how to customize the loader in order to place AutoNum at a particular RAM location. It also explains how AutoNum works.

Customizing the Loader

As mentioned earlier, AutoNum resides in a part of RAM that won't interfere with Basic programs. On the Commodore 64, it begins at location 49152. On the VIC-20, there is no free RAM area for machine language use, so the loader "steals" a page of Basic program space by moving the top-of-memory pointer down 256 bytes. If you won't be using AutoNum with a Datassette, you can reclaim this program space by deleting line 90 of the loader and changing line 100 to read:

```
100 BASE = 828
```

This will cause AutoNum to be Poked into the cassette buffer, which is a great place to put short machine language subroutines as long as you are *not* using a Datassette. (C-64 users can also redirect AutoNum to the cassette buffer by making the same changes.)

For those of you familiar with machine language, you can move AutoNum to any other location in RAM

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by changing the value assigned to BASE on line 100. (Of course, you must be careful not to place the routine where it interferes with Basic or with the operating system, or you might cause a "crash.")

How AutoNum Works

Each time you type in a line and press the return key, Commodore's built-in Basic interpreter has to decide what to do with it. If it begins with a line number, Basic assumes it is a line to be added to the program currently in memory and acts accordingly. If the line doesn't begin with a number, Basic assumes it is a direct command (like New or Save, for example) and executes it immediately. The part of Basic responsible for reading and processing lines is built into ROM, and a pointer to this important main processing routine is stored at RAM locations 770 and 771.

Ordinary Basic will display a syntax error if you attempt to use the Auto command without first running the AutoNum loader. So how does the AutoNum loader add a new command, Auto in this instance, to the Basic repertoire? The loader Pokes a machine language subroutine into RAM where it won't be disturbed by Basic. The loader then changes the pointer stored at 770 and 771. From then on, control is diverted to AutoNum instead of to Basic's main processing loop.

If AutoNum is enabled, it prints a line number. After a line is typed in at the keyboard, AutoNum examines it to determine whether or not it begins with the word "Auto." If it does, then AutoNum processes the line, and regular Basic never gets involved. If the line does not begin with "Auto," the line is passed on to Basic to be processed in the usual fashion.

You can easily see why this diversionary tactic is called a wedge. In effect, AutoNum is "wedged" between the user and Basic's regular processing loop. (Another popular wedge is the DOS wedge, which works much the same way. It checks each line you type in to see if it begins with a ">"; if it does, it processes the line as a disk command instead of passing the line on to Basic.)

There are many good books that can teach you more about wedges. Two of the best are *Tool Kit: Basic*, by Dan Heeb (Commodore Publications) and *Machine Language for the Commodore 64 and Other Commodore Computers*, by Jim Butterfield (Brady Communications). R

Address all author correspondence to Michael Broussard, 13136 Lazy Glen Court, Herndon, VA 22071.

Listing 1. *AutoNum Basic loader program.*

```
8Ø SYS65517:IFPEEK(781)=22THENVIC=1 :REM*98
9Ø IF VIC THENX=PEEK(56):BASE=PEEK(55)+256*
   (X-1)+1:POKE56,X-1:GOTO 11Ø      :REM*242
1ØØ BASE=49152                      :REM*3Ø
11Ø WEDGE=BASE+11                   :REM*38
12Ø PRINT"{SHFT CLR}{4 SPACEs}INITIALIZING.
   .."                              :REM*248
13Ø FORK=BASETOBASE+186:READN:POKEK,N:C=C+N
   :NEXT                            :REM*4
14Ø IFC<>17Ø67THENPRINT"{CTRL 9}ERROR IN DA
   TA STATEMENTS!":END              :REM*1Ø6
15Ø PRINT"{SHFT CLR}{2 CRSR DNs}TO ENABLE,
   TYPE:":PRINT"{CRSR DN}{5 SPACEs}AUTO <I
   NCREMENT>"                       :REM*19Ø
16Ø PRINT"{CRSR DN}TO DISABLE, TYPE:":PRINT
   "{CRSR DN}{5 SPACEs}AUTO"        :REM*234
17Ø X2=INT(WEDGE/256):X1=WEDGE-X2*256:POKEB
   ASE+1,X1:POKEBASE+6,X2           :REM*28
18Ø IF VIC=Ø THEN 21Ø               :REM*166
19Ø C=Ø:FORK=1TO6:READN:POKE(BASE+N),PEEK(B
   ASE+N)+32:C=C+N:NEXT             :REM*194
2ØØ IFC<>75ØTHEN14Ø                 :REM*212
21Ø SYSBASE:CLR:NEW                 :REM*23Ø
1ØØØ DATA 169,11,141,2,3,169,192,141,3,3,96
     ,173,54,3,2Ø8,5,173,55,3,24Ø,49,173
                                    :REM*65
1Ø1Ø DATA 52,3,24Ø,44,173,56,3,24,1Ø9,54,3,
     141,54,3,173,57,3,1Ø9,55,3,141,55,3
                                    :REM*31
1Ø2Ø DATA 174,54,3,32,2Ø5,189,169,32,32,21Ø
     ,255,169,2,133,198,169,145,141,119
                                    :REM*1Ø5
1Ø3Ø DATA 2,169,17,141,12Ø,2,32,96,165,134,
     122,142,58,3,132,123,14Ø,59,3,32
                                    :REM*254
1Ø4Ø DATA 115,Ø,144,67,24Ø,65,2Ø1,65,2Ø8,84
     ,32,115,Ø,2Ø1,85,2Ø8,77,32,115,Ø
                                    :REM*48
1Ø5Ø DATA 2Ø1,84,2Ø8,7Ø,32,115,Ø,2Ø1,79,2Ø8
     ,63,169,Ø,141,52,3,141,54,3,141,55
                                    :REM*1Ø4
1Ø6Ø DATA 3,32,115,Ø,32,1Ø7,169,165,2Ø,141,
     56,3,24Ø,3,141,52,3,165,21,141,57,3
                                    :REM*74
1Ø7Ø DATA 24Ø,3,141,52,3,76,116,164,32,1Ø7,
     169,2Ø8,8,141,54,3,141,55,3,24Ø,1Ø
                                    :REM*144
1Ø8Ø DATA 165,2Ø,141,54,3,165,21,141,55,3,1
     74,58,3,172,59,3,76,134,164    :REM*24
1Ø9Ø DATA 5Ø,72,131,154,157,186     :REM*21Ø
```

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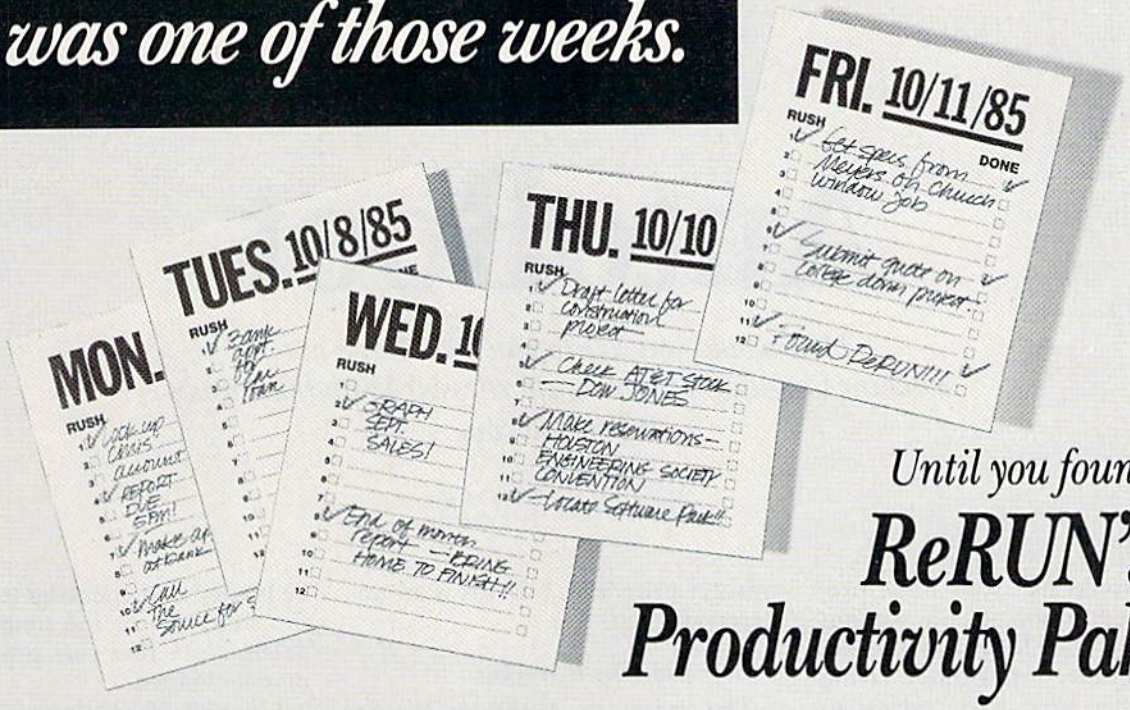

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How would you like to run your Basic and machine language programs effortlessly? With this handy utility, you can.

By DOUG SMOAK

If you would like your Basic programs to run automatically without typing in RUN, or have machine language programs start without having to remember what SYS address to use, then you'll appreciate AutoBoot. AutoBoot makes self-starting "boots" that load and run Basic or machine language programs from disk.

How To Use AutoBoot

After typing in Listing 1, save it before running it. After running, you may either read instructions or continue with the creation of a boot. After a pause in which the program sets up an array, you must supply the name of the program you want to run automatically. You can use any valid filename and can have a wild card (*) on the end.

You must then supply a name for the boot itself. The best way to do this is first to save the program under a simple name such as A, then call the boot the actual name of the program. Then, when the user loads

```
"program name",8,1
```

the boot will automatically load and run the intended program. Note that the boot *must* be loaded as a nonrelocating program file, hence the ,1 after the device number 8. Also note that the disk to which you want the boot saved must be in the drive while AutoBoot is creating the boot. You can transfer the boots with a program such as Copy All or other single-file transfer programs, but this is an unnecessary step.

How and Why It Works

The secret to AutoBoot lies in where the boots load. They load in over the stack of the 6510 CPU. This makes the Load Kernal routine load program data into location $0202 (decimal 514). When the Load Kernal routine reaches the last RTS (return to stack), control is returned to location $0203 (decimal 515).

Location $0203 is the start of the loading and running routines, so the computer executes these routines without returning to Basic.

AutoBoot starts by substituting input into an array before opening a write-program file. Since the first two bytes of a program file make up the Load address, Autoboot can create a program that will load over the stack and directly into the input buffer.

Program Description

To help you understand the program, and in case you want to modify it for your own needs, I'll give a brief breakdown of it.

Lines 10–30 initialize the variables, clear the screen, set screen and border colors and prompt for instructions.

Lines 40–50 set up the initial values for the array that will be modified by your input.

Lines 60–70 begin the input by first getting the name of the file to be loaded and checking to see if it is too short ("") or too long (LEN(N$) >16). Note that *only* program files may be loaded.

Lines 80–90 continue input by asking if the program to be loaded and run is in Basic or machine language.

Lines 100–130 set up the array to load a machine language file and SYS to its starting address. Note that the lowest address allowed by line 120 is 2048. If you have a special need for a lower address, such as a short program that loads into the cassette buffer, then change or eliminate the If...Then in line 120.

Lines 140–150 put the name of the file to be loaded and run into the proper place in the array.

Lines 160–170 handle input of the name for the boot itself. This is the name that will later be loaded

```
"name",8,1
```

Lines 180–260 do the actual writing of the boot to disk. Line 200 sets the load address (decimal 256, HEX $0100) to the start of the CPU's stack. Line 220 makes the screen border change colors, so that when the drive pauses, you know the program is still running.

Lines 270–440 make up the instruction subroutine. They, along with line 30, could be eliminated, but it's nice to have them.

Lines 450–660 contain the data that is read into the array from line 50.

Lines 670–690 read the disk drive's

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error channel to make sure things are all right.

Final Notes

AutoBoot, as is, will not create boots that display the searching and loading messages for the program to be autorun. I felt this would be confusing to novice users. If you want the messages for your own peace of mind, then substitute the number 128 for the first 0 after the first 169 in line 620. If you want to use a drive with a device number other than 8, then substitute 9s for the two 8s in line 620.

Above all, remember that the boots *must* be loaded with a ",1" after the 8, such as

```
LOAD "PROGRAM",8,1
```

I hope you enjoy making your programs run automatically. It adds a professional touch and keeps control in the hands of the programmer; novice users can then be free to interact with the software with a minimum of effort. R

Address all author correspondence to Doug Smoak, 303 Heyward St., Columbia, SC 29201.

Listing 1. *AutoBoot program.*

```
Ø REM**********************************
                                    :REM*5Ø
1 REM*{32 SPACEs}*                  :REM*51
2 REM*{11 SPACEs}AUTOBOOT 64{1Ø SPACEs}*
                                    :REM*66
3 REM*{11 SPACEs}(C) 1984{13 SPACEs}*
                                    :REM*43
4 REM*{11 SPACEs}DOUG SMOAK{11 SPACEs}*
                                    :REM*236
5 REM*{11 SPACEs}3Ø3 HEYWARD ST.{6 SPACEs}*
                                    :REM*77
6 REM*{11 SPACEs}COLUMBIA SC 292Ø1{4 SPACEs
  }*                                :REM*226
8 REM*{32 SPACEs}*                  :REM*58
9 REM**********************************
                                    :REM*59
1Ø DIMA(335):I=1:BO=5328Ø:BG=BO+1:POKE646,1
   5:PRINT"{SHFT CLR}{CRSR DN}{CRSR RT}AUTO
   BOOT 64"                         :REM*Ø
2Ø POKEBG,11:POKEBO,12              :REM*196
3Ø PRINT"{CRSR DN}{CRSR RT}INSTRUCTIONS? {C
   TRL 9}Y/N{CTRL Ø}":GOSUB44Ø:IFG$="Y"THEN
   GOSUB27Ø                         :REM*25Ø
4Ø PRINT"{SHFT CLR}{CRSR DN}{CRSR RT}SETTIN
   G UP..."                         :REM*238
5Ø READA:IFA>=ØTHENA(I)=A:I=I+1:GOTO5Ø
                                    :REM*28
6Ø INPUT"{SHFT CLR}{CRSR DN}{CRSR RT}NAME O
   F FILE TO BE LOADED";N$:IFN$=""THEN6Ø
                                    :REM*12Ø
7Ø IFLEN(N$)>16THENPRINT"{CRSR DN}{CRSR RT}
   NAME TOO LONG!":GOTO6Ø           :REM*234
8Ø INPUT"{CRSR DN}{CRSR RT}IS THIS A BASIC
   PROGRAM {CTRL 9}Y/N{CTRL Ø}";BS$:IFBS$="
   "THEN8Ø                          :REM*14
9Ø IFBS$<>"N"THEN14Ø                :REM*66
1ØØ FORI=292TO315:A(I)=234:NEXT     :REM*158
11Ø PRINT"{CRSR DN}{CRSR RT}SYS ADDRESS FOR
    ML START (DECIMAL)"             :REM*8
12Ø INPUT"{CRSR DN}{CRSR RT}";SY$:SY=VAL(SY
   $):IFSY<2Ø48THEN11Ø              :REM*252
```

→

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Listing 1 continued.

```
13Ø A(319)=INT(SY/256):A(318)=SY-256*A(319)
    :A(317)=76                          :REM*184
14Ø A(275)=LEN(N$):FORJ=1TOLEN(N$)      :REM*11Ø
15Ø A(319+J)=ASC(MID$(N$,J,1)):NEXT:REM*178
16Ø INPUT"{CRSR DN}{CRSR RT}NAME OF AUTORUN
     BOOT";F$:IFF$=""ORF$=N$THEN16Ø:REM*2Ø2
17Ø IFLEN(F$)>16THENPRINT"{CRSR DN}{CRSR RT
    }NAME TOO LONG!":GOTO16Ø            :REM*22Ø
18Ø OPEN15,8,15                         :REM*86
19Ø OPEN8,8,8,F$+",P,W":GOSUB67Ø        :REM*166
2ØØ PRINT#8,CHR$(Ø);CHR$(1);            :REM*21Ø
21Ø FORI=1TO335:PRINT#8,CHR$(A(I));:REM*142
22Ø IFI/3Ø=INT(I/3Ø)THENPOKEBO,(PEEK(BO)+1)
    AND15                               :REM*242
23Ø NEXT:POKEBO,12                       :REM*4
24Ø GOSUB67Ø:CLOSE8:CLOSE15             :REM*6Ø
25Ø PRINT"{CRSR DN}{CRSR RT}AUTORUN BOOT NA
    ME...{CTRL 2}"F$                    :REM*21Ø
26Ø END                                  :REM*7
27Ø PRINT"{SHFT CLR}{CRSR DN}{CRSR RT}THIS
    PROGRAM WILL CREATE A 'BOOT'"       :REM*33
28Ø PRINT"{CRSR DN}{CRSR RT}THAT WILL {CTRL
     2}AUTORUN{COMD 8} WHEN LOADED AND THEN
    "                                   :REM*119
29Ø PRINT"{CRSR DN}{CRSR RT}LOAD AND {CTRL
    2}RUN{COMD 8} THE PROGRAM THAT YOU WANT
    "                                   :REM*17
3ØØ PRINT"{CRSR DN}{CRSR RT}TO HAVE AUTORUN
    . NOTE THAT THIS IS FOR"            :REM*117
31Ø PRINT"{CRSR DN}{CRSR RT}DISK ONLY AND T
    HAT THE 'BOOT' {CTRL 2}MUST{COMD 8} BE"
                                        :REM*7
32Ø PRINT"{CRSR DN}{CRSR RT}LOADED WITH A ,
    1 AFTER IT, SUCH AS..."             :REM*175
33Ø PRINT"{CRSR DN}{CRSR RT}LOAD 'PRG',8,1.
    "                                   :REM*1Ø7
34Ø PRINT"{2 CRSR DNs}{CRSR RT}THIS WILL MA
    KE AUTORUN BOOTS FOR {CTRL 2}BASIC{COMD
     8}"                                :REM*65
35Ø PRINT"{CRSR DN}{CRSR RT}OR {CTRL 2}MACH
    INE LANGUAGE{COMD 8} PROGRAMS."     :REM*5
36Ø PRINT"{2 CRSR DNs}{CRSR RT}{5 SPACEs}{C
    TRL 9}<PRESS ANY KEY{2 SPACEs}TO CONTIN
    UE>{CTRL Ø}":GOSUB44Ø               :REM*187
37Ø PRINT"{SHFT CLR}{CRSR DN}{CRSR RT}NOTE
    ALSO THAT THE BOOT ACTS LIKE A ":REM*91
38Ø PRINT"{CRSR DN}{CRSR RT}NON-RELOCATING
    LOAD (LOAD 'PRG',8,1) "             :REM*189
39Ø PRINT"{CRSR DN}{CRSR RT}SO BE SURE THAT
     THE PROGRAM TO BE "                :REM*13
4ØØ PRINT"{CRSR DN}{CRSR RT}LOADED HAS BEEN
     SAVED FROM THE PROPER"             :REM*113
41Ø PRINT"{CRSR DN}{CRSR RT}LOCATION OR THE
     HEADER HAS BEEN "                  :REM*83
42Ø PRINT"{CRSR DN}{CRSR RT}RE-WRITTEN."
                                        :REM*53
43Ø PRINT"{2 CRSR DNs}{CRSR RT}{5 SPACEs}{C
    TRL 9}<PRESS ANY KEY{2 SPACEs}TO CONTIN
    UE>{CTRL Ø}"                        :REM*171
44Ø GETG$:ON-(G$="")GOTO44Ø:RETURN      :REM*163
45Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*145
46Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*155
47Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*165
48Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*175
49Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*185
5ØØ DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*195
51Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*2Ø5
52Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*216
53Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*226
54Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*236
55Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*246
56Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*Ø
57Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*1Ø
58Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*2Ø
59Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*3Ø
6ØØ DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*4Ø
61Ø DATA 2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
                                        :REM*5Ø
62Ø DATA 2,Ø,Ø,Ø,12Ø,169,Ø,133,157,169,8,16
    2,8,16Ø,1                           :REM*92
63Ø DATA 32,186,255,169,8,162,63,16Ø,2,32,1
    89,255,169,Ø,32                     :REM*92
64Ø DATA 213,255,134,45,132,46,169,82,141,1
    19,2,169,85,141,12Ø,2,169,78,141
                                        :REM*116
65Ø DATA 121,2,169,13,141,122,2,169,4,133,1
    98,88,1Ø8,2,3                       :REM*84
66Ø DATA32,32,32,32,32,32,32,32,32,32,32,32
    ,32,32,32,32,-1                     :REM*34
67Ø INPUT#15,A,B$,C,D:IFATHEN69Ø        :REM*166
68Ø RETURN                              :REM*228
69Ø PRINT"{CRSR DN}"A;"{CTRL 9}"B$" ERROR{C
    TRL Ø}":CLOSE8:CLOSE15:END          :REM*6
```


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1541 Number Changer

All you need is a sharp knife and a steady hand to change your disk drive device number with this simple hardware construction project.

By LARRY COTTON

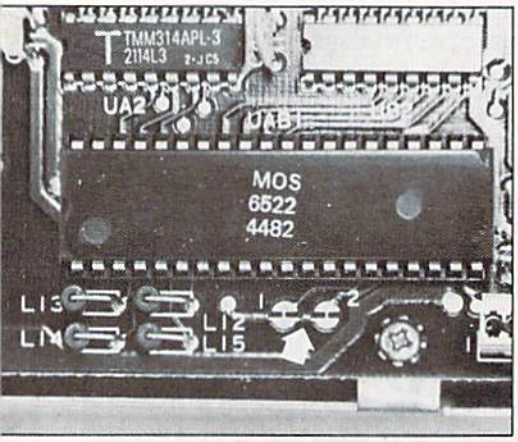

Photo 1. *Jumpers to be cut to change the disk drive device numbers in the older version of the 1541.*

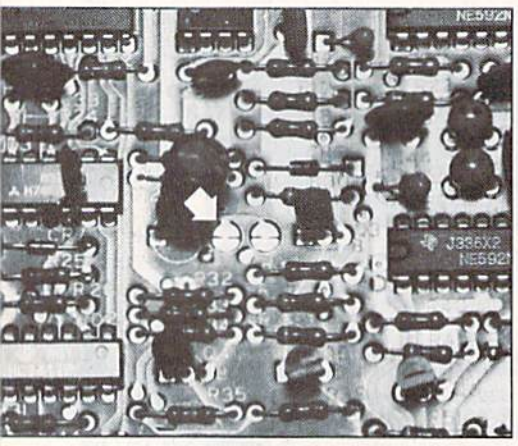

Photo 2. *Jumpers to be cut to change the disk drive device numbers in the newer version of the 1541.*

Some Commodore 64 programs are easiest to use with two 1541 disk drives because dual drives allow you to create backup files quickly and save data during program execution. When you finally buy that second disk drive, you'll probably want to more or less permanently change the device number (normally 8), to avoid having to change it via software every time.

On page 40 of the *1541 User's Manual* is a step-by-step procedure on how to make this change. However, on some models it's impossible to follow these directions to the letter.

After disconnecting power and removing the case and the perforated metal housing through step 6, look at the top of the circuit board (where the components are mounted) with the disk door (the front) *toward* you.

Step 7 says to locate the device number jumpers. There are two possible places the jumpers can be located on the board, depending on which construction you have. If you own what we'll call version A (older drives), they will be on the left edge in the middle of the board, as the book says. But if you have version B, they'll be located slightly to the front and left of the center of the board.

Don't look for wires. Do look for two ¼-inch white circles around shiny silver spots. These are the jumpers. On version A, they are labeled 1 and 2 (see Photo 1). On version B, they are unlabeled (see Photo 2).

What you must do is destroy the little connecting strip (trace) between a pair (or between both pairs) of the D-shaped spots. This is the equivalent of snipping a short wire jumper soldered between two points on a circuit board.

Which jumper do you cut? Again, this depends on which construction you have. If you have version A, your new device number will be the sum of 8 and the number of the jumper you cut. For example, if you cut jumper 1, your new device number will be 9.

If you have version B, cutting the jumper *nearest the front* will convert your disk drive from device 8 to device 9. If you cut only the rear-most jumper, you'll convert your drive from 8 to 10. If you cut both jumpers, your new device number will be 11.

The cutting (actually more like a scraping) should be done with a sharp-pointed knife. A number 11 blade in an X-acto knife is ideal. Scrape until you can see the circuit board through the gap.

Should you make a mistake or change your mind, you can easily reconnect the jumper by soldering. Use a pencil gun of no more than 30 watts, tinned well, and very carefully apply gun and solder to the D-pads, letting the solder flow across the gap.

Test your work before you put the case back together by loading a disk directory with your *new* device number (for example, LOAD "$",9). If all is well, carefully reassemble the metal housing and case and enjoy your second disk drive! R

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Poking Around The Screen

By ALTA MOSER and JIM BORDEN

The following article will be helpful to users who don't want to wait for Print statements. How and where to Poke the screen is explained, and several formulas and sample programs are provided.

The formula to Poke a character at a given location on the screen is:

```
P = 1024 + X + 40*Y
```

Here, P is the location to Poke. To find this location, start with the beginning of screen memory (1024), add the column (X) and, finally, add the product of 40 and the row (Y). For the formula to work properly, columns must be numbered from 0 to 39, and rows from 0 to 24.

You can think of screen memory as a chart, with X and Y as the coordinates by which you can find any point on the chart. Go across to any column and down to any row, and where the two intersect will be the location for that row and column.

The formula uses 40 because there are 40 columns on the screen (numbered 0 to 39, of course).

Let's assume you want to Poke column 1, row 1, with the letter A. You can look up the value to Poke in Appendix E of the C-64's user's guide. The letter A is stored in screen memory as a 1. Here is a program to store it:

```
10 X = 1:Y = 1
20 P = 1024 + X + 40*Y
30 POKE P,1
```

Character placement via Pokes on the screen is fun, fast and fascinating. Never again will you have to rely on the cumbersome Print statement for accessing screen locations.

Row 1, column 1, is location 1065. You can check Appendix G of the C-64's user's guide to confirm this. If you omitted the 40 from the formula, the computer would figure the location like this:

```
10 X = 1:Y = 1
20 P = 1024 + X + Y
30 POKE P,1
```

Obviously, the computer would Poke 1 into location 1026, which is column 2, row 0 in screen memory.

Now try this:

```
5 PRINT " {SHFT CLR}"
10 FOR T = 1 TO 10
20 INPUT "COLUMN (0-39)";X
30 INPUT "ROW (0-24)";Y
40 PRINT "{HOME}"
50 P = 1024 + X + 40*Y
60 POKE P,0
70 NEXT T
```

RUN It Right

C-64; C-128 (in 40-column mode only)

How would you like to fill the entire screen memory? This program is one way to do it:

```
1 PRINT "{SHFT CLR}"
5 FOR X = 0 TO 39
10 FOR Y = 0 TO 24
15 P = 1024 + X + 40*Y
20 POKE P,102
25 NEXT Y:NEXT X
30 GOTO30
```

Now that you know X can be one of 40 numbers (0–39) and Y one of 25 (0–24), you can Poke any number of random locations. The following program will demonstrate this:

```
1 PRINT "{SHFT CLR}"
2 INPUT "HOW MANY POKE
  LOCATIONS";PL
5 FOR H = 1 TO PL
10 X = INT(40*RND(1))
20 Y = INT(25*RND(1))
30 P = 1024 + X + 40*Y
40 POKE P,81
50 NEXT H
60 GOTO60
```

Now would be a good time to consider a companion formula to Poke color memory, since the formula uses the same X and Y coordinates. Another look at the Color Memory Map (Appendix G) will show that color memory begins at location 55296. The column and row numbers remain the same. (C-128 owners should type, in Direct mode,

```
BANK 15 {return}
```

to ensure this memory is banked in properly. Also, be sure you are in 40-column mode.)

With that in mind, the formula to Poke a value in color memory is:

```
CP = 55296 + X + 40*Y
```

The Poke numbers for color are 0–15 (again, refer to Appendix G).

If you wanted to randomly color the characters Poked into random locations in the previous program, you could do it by adding these lines:

```
25 C = INT(16*RND(1))
35 CP = 55296 + X + 40*Y
45 POKE CP,C
```

Have you noticed that you may have fewer characters than you asked for in line 5? There are two reasons for this. One, if the computer randomly selected the same row and column number twice, it would Poke the same character in the same location twice. Two, if you're using color, the random color number Poked might be the same as the background color, so the Poked character, although there, wouldn't be visible.

But you can control your background color to eliminate the problem of having the character the same color. The location to Poke the background color is 53281. (You can also change the border color with POKE 53280, but we're mainly interested in controlling the background.) Let's change the background to black and eliminate black as a possible random color number. In the previous program, add this line:

```
3 POKE 53281,0:PRINT "{CTRL 2}"
```

And change line 25 to:

```
25 C = INT(15*RND(1)) + 1
```

Now every color should show up on a black screen.

What you did was Poke the background to 0 (black) and change the random number selection for colors, so the computer would have to use the numbers 1 to 15, thereby eliminating 0 as a possible character color.

To get the effect of a stained glass window, try changing the border to black (POKE 53280,0) and using 1000 for PL. Those black spaces you see without any color are the result of combinations not chosen by the random numbers. If you want to color the entire screen, make the following changes to the previous program:

Delete lines 2 and 5.

Change line 10 to:

```
10 FOR X = 0 TO 39
```

Change line 20 to:

```
20 FOR Y = 0 TO 24
```

And change line 50 to:

```
50 NEXT Y:NEXT X
```

But what if you only wanted to use a 10 × 10 grid on the lower part of the screen? Well, you'd only use part of the screen memory map. Begin by determining which column and row this part will start and end with. For the sake of simplicity, let's assume column 10 and row 10 will be your starting point, and use ten columns across and ten rows down.

So, your rows and columns will be from 10 to 19, with 10 as the first, 19 as the last. Type NEW to clear any old program and enter the following lines:

```
5 PRINT "{SHFT CLR}"
15 FOR X = 10 TO 19
20 FOR Y = 10 TO 19
25 P = 1024 + X + 40*Y
30 POKE P,81
35 NEXT Y:NEXT X
```

Line 5 clears the screen. Lines 15 and 20 define the limits of your grid, starting at column 10 and row 10 and ending at column 19 and row 19. Line 25 is your Poke formula and line 30 prints a ball at column 10 and row 10. Line 35 sends the computer back to line 20, where it repeats the process to print another ball at the next Poke location.

If you want to color the grid, add these lines:

```
28 CP = 55296 + X + 40*Y
31 POKE CP,5
```

Line 28 is the color Poke formula. Line 31 makes whatever is in that location green, which is color Poke number 5. You could use any number from 0 to 15 to find a color you like better. Or change the background to find a more pleasing combination.

Maybe you'd like to number your locations across and down. No problem.

The grid starts on row 10, so your numbers across will be on row 9 and will be from 0 to 9. You could number from 1 to 10, but the 0 on the 10 would extend one column beyond the grid, causing you to expand your grid with a step in the For. . . Next statement. Anyway, it's good practice to start your numbering with 0, since the formula is designed to use 0. The Poke value for a 0 is 48. The column numbers will be the same, from 10 to 19 with a row number of 9.

Add the following lines to the previous program that printed the grid:

```
40 Y = 9:S = 48
50 FOR X = 10 TO 19
60 P = 1024 + X + 40*Y
70 POKE P,S:S = S + 1
80 NEXT X
```

Line 40 sets the row to 9 and sets S to 48, the value of the character 0. Line 50 sets your column as 10 through 19. Line 60 is your familiar Poke formula. Line 70 puts 0 into column 10, row 9, and also adds 1 to S to make S = 49, which is the value of 1. Line 80 simply returns to line 50 to repeat the process. I hope you were able to follow all that.

If you did, it should be relatively simple for you to number the rows. Just repeat the process, but change the column to 9 and the rows to 10 through 19. Here's how to do it:

```
90 S = 48:X = 9:FOR Y = 10 TO 19
100 P = 1024 + X + 40*Y
120 POKE P,S:S = S + 1:NEXT Y
```

Incidentally, you can avoid retyping the formula by putting it into a subroutine. If you put both Poke formulas (screen and color) into a subroutine, you could also color the numbers.

The following program is a recap of the program to Poke the grid, color the characters and number the rows and columns. It also colors the numbers in lines 70 and 120. POKE CP,8 in these lines colors the numbers yellow. Again, you can use any color number you want.

You aren't limited to 81 for the character, either. Try other numbers to achieve different results. For example, use POKE 122 for a crossword-type grid or use 250 (122 + 128 for reverse video) for a reverse square. The program also makes use of a subroutine at line 500 for the formula. It is somewhat wasteful of memory, since more statements can be put on one line, but it was done for the sake of clarity.

```
5 PRINT"{SHFT CLR}"
15 FORX = 10TO19
20 FORY = 10TO19
25 GOSUB 500
30 POKEP,81
31 POKE CP,5
35 NEXT Y:NEXT X
40 Y = 9:S = 48
50 FORX = 10TO19
60 GOSUB 500
70 POKEP,S:POKE CP,8:S = S + 1
80 NEXTX
90 S = 48:X = 9:FORY = 10TO19
100 GOSUB 500
120 POKE P,S:POKE CP,8:S = S + 1
130 NEXTY
300 END
500 P = 1024 + X + 40*Y
505 CP = 55296 + X + 40*Y
510 RETURN
```

Speeding Up Your Basic Programs

The intermediate or advanced programmer can use several tricks to speed up Basic. The beginner should

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understand the programs above before trying these tricks.

When using a number frequently, it is better to assign the number to a variable early in the program. In the Poke formula, 1024 and 40 are often used, so assign these numbers to variables. Since 1024 is a base, it could be called BA. The screen width is 40, so SW or XW could be used for this. It is better to use a two-character variable because it is less likely to be used within your program.

The reason variables run faster than numbers in Basic is simple. When a number is used in Basic, the digits are read and converted to a floating-point format. So, A = 123 requires quite a bit of work by Basic. Variables, on the other hand, are stored in floating-point format to begin with (except integer variables, which end with the "%" character).

So Basic can look up a variable much faster than it can convert a number to floating-point form. An added advantage of using a variable is that to modify all references to the base memory location, you need only change the line that assigns the original value.

Another way to save time is to eliminate multiplication or division. You may have noticed that the screen memory and color memory use the base memory location + X + 40*Y (lines 500 and 505). Actually, line 505 can be written as:

```
505 CP = 54272 + P
```

This eliminates one multiplication and one addition. If these lines are used often (120 times in the last program above), the time saved adds up!

A little time can also be saved by eliminating the variable after the Next statement. This is something that will make the listing harder to follow, so unless you must use every trick for speed, it is probably better to retain this variable.

There is another place where time and memory can be saved. A little-used keyword in Basic is the user-defined function. A function can be used, for example, to create a random number in a certain range. Here is how to define a random number function:

```
7 DEF FNR(Z) = INT(Z*RND(1)) + 1
```

DEF is used to define a function. The letters FN start the function name. The R is the name of this function. Any legal variable name can follow the FN to name the function. Then a dummy variable is required within parentheses. An equals sign follows the name and then comes the actual formula that defines the function.

To call the function, use a line like this one:

```
200 X = FNR(15)
```

Wherever the dummy is used in the definition, the number or variable will be used when the function is called. Here, 15 is used wherever Z appears in the definition. So, if the line above were called, X would be equal to some number from 1 to 15. By changing the number in parentheses, you can change the range of random numbers.

The time saved with a function call results from replacing a subroutine. When a subroutine is called, Basic starts with the first line number and looks at each line in the program until it finds the number of the Go-sub line. If the subroutine is placed at the end of the program, it takes a while to find it. A function definition must be at the start of a program, so it can be found quickly.

You can time your changes with Basic's built-in clock. Set it to 0 with TI$ = "000000" on a line just before you start timing. Then, after the section is done, use PRINT TI to get the number of jiffies it took. (A jiffy is equal to 1/60 of a second.)

Time the previous listing, then try the following listing to see the time you can save. The second program runs about one-third faster. Experiment to see how much time you can save in other programs.

```
5 PRINT"{CLR HOME}":X = Y:P1 = 1024:
  Y1 = 40:C1 = 54272:DEF FNP(Q) =
  P1 + X + Y1*Y
10 TI$ = "000000"
15 FORX = 10TO19
20 FORY = 10TO19
25 P = FNP(Q):CP = C1 + P
30 POKEP,81
31 POKE CP,5
35 NEXT:NEXT
40 Y = 9:S = 48
50 FORX = 10TO19
60 P = FNP(Q):CP = C1 + P
70 POKEP,S:POKE CP,5:S = S + 1
80 NEXT
90 S = 48:X = 9:FORY = 10TO19
100 P = FNP(Q):CP = C1 + P
120 POKE P,S:POKE CP,8:S = S + 1
130 NEXT
299 PRINT TI
300 END
```

[R]

Address C-64 questions to Alta Moser, 11061 Cypress Ave., Riverside, CA 92505; address C-128 questions to Jim Borden, Borden Software, 641 Adams Road, Carlisle, PA 17013.

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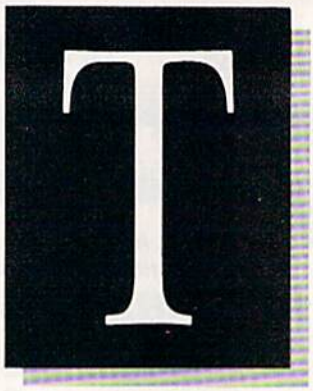

By ROBERT SIMS

Telecomputing Workshop is a monthly column directed to the needs of RUN *readers who are using, or intend to use, their Commodore computers for telecommunications. This second installment answers your questions about terminal programs and accessing information services.*

Which terminal program would you recommend I buy?

Unless you intend to limit yourself to the simplest telecomputing applications, you will need more than one terminal program. Before you get a terminal program, you should answer these questions:

1. Will it work with my modem?
2. If I have an auto-dial modem, will it work with my telephone dialing system?
3. Does it use the same text codes (ASCII) as the software used on the computer I will be calling?
4. Does it have the same file transfer protocol as the software used on the computer I will be calling?

Home telecomputing is still in a pioneer state, requiring some technical knowledge in order to make good use of its services. Unfortunately, many terminal programs are not fully documented, and you may not find answers to these questions in the manual. Similarly, salespeople in computer stores are not necessarily familiar with all the aspects of telecommunications.

If you are a beginner, your safest path is to depend on friends to help you answer these questions. If you are on your own, though, here are some guidelines through the technical muddle.

For general use, a terminal program should:

—transmit data in standard ASCII format and in CBM ASCII format.
—have a buffer in which you can capture incoming data to be stored to disk.
—allow you to load text files from your disk to the buffer, to be sent over the modem.

A terminal program with these capabilities will allow you to exchange text with most other modem owners. However, most Commodore owners buy modems mainly to send and receive programs. Sending programs over a modem requires more stringent standards than sending text, because of the possibility of garbage (errors) caused by noise on the telephone line.

If someone is typing a message to you over the modem and an error occurs, it's usually no big deal; you can figure out what they are trying to say. But if an error creeps into a program listing as it is being transmitted, it could cause disastrous results when you try to use the program later.

What is a protocol?

To ensure accurate transmission of programs and other error-sensitive files, programmers have devised protocols—special ways of sending information over the modem with built-in error checks.

As home telecommunications has grown, the various information services have created their own protocols. CompuServe has A and B protocols, and Punter bulletin boards use Punter protocols. In recent years, a protocol called XModem has emerged as a standard.

These various protocols are not compatible; for instance, you can't use XModem to swap files with a computer running Punter protocols. However, since XModem has become standard, most services are allowing callers to choose between XModem and the services' custom protocols, and software writers are adding XModem capability to their programs. (For example, Runterm Plus, the terminal program published in the December 1985 and January 1986 issues of *RUN*, is compatible with either XModem or Bozart protocols.)

A terminal program with XModem capability will get you onto CompuServe, The Source, Delphi and most local bulletin boards.

There are several very good public domain terminal programs that you should be able to get from your local user's group for the cost of a disk. (Public domain programs can be freely copied by anyone.) The most popular of these are XMOBUF and CBTERM.

Will any terminal program allow access to any on-line network?

The trend in home telecomputing is toward integration, which means

you need a special terminal program to access a particular on-line service. Viewtron, QuantumLink and PlayNet are examples of integrated systems. General-purpose terminal programs will not work with these services. If you want to access an integrated system, the system operator will see that you get the right terminal program.

Can you use any modem with any terminal program?

When you buy a modem, you'll probably find a terminal program in the package. The quality of these free terminal programs varies wildly, from rotten to very good. Whatever its general quality, you can be sure that it is compatible with your modem and will be adequate until you can acquire a more sophisticated terminal program.

However, when you go shopping for a terminal program, you should be aware that not all programs will work with all modems. Unless the documentation specifies that it works with a particular modem, you should not assume that it will. There are three reasons for possible incompatibility:

Pulse vs tone dialing. First, some modems, such as the 1660, require software that automatically dials the telephone. There are two dialing systems in U.S. phone systems—pulse and tone. Some terminal programs dial with tones and some send pulses.

If a terminal program uses tones to dial the phone, then it will not work on a pulse line. On the other hand, a pulse-dialing terminal program will work on either pulse or tone systems. You can tell which system you have by looking at your telephone. If your phone has a dial, it's a pulse system; if it has buttons, it's a tone system.

Hardware incompatibility. Another, more technical, difference between automatic modems is in the signals used to put the modem on-line (pick up the phone) and take it off-line (hang up the phone). The CBM 1650, Westridge and Telelearning modems use one set of pick-up/hang-up signals; the Mitey Mo and HES II share a second set; the 1660 uses a third set of signals; and generic modems use still other pick-up/hang-up signals.

Although there is no real standard, the most popular terminal programs are written for the CBM 1650, and terminal programs that do not allow you to select your modem type usually work only with the 1650-type modem.

Carrier signal. Another potential source of incompatibility is the carrier signal, which is used to detect another computer on the phone line. Some terminal programs will check for a carrier signal to be sure the two computers are properly connected. This type of terminal program may not work with the old version of the 1660 or with generic modems, which do not have an automatic carrier-detect feature.

What is ASCII? Why are there different versions?

ASCII is an abbreviation for American Standard Code for Information Interchange. It is a code adopted by the U.S. government for exchanging data between computers that otherwise cannot communicate. ASCII was developed primarily to send simple documents using the standard typewriter keys, plus a few control codes that told the computer when a message started, ended, and so on.

As computers—especially personal computers—evolved, ASCII became outdated. It had no codes to represent color or graphics characters, for example. So, computer designers had to change or expand the ASCII codes to fit the unique needs of the new computers.

How do telecommunications networks answer all those calls with the same telephone number? Also, how do their systems handle it?

Most of the national information networks have a contract with a value-added carrier, whose business it is to provide special telephone lines that connect callers to the service. The carrier has a network of local telephone numbers, called nodes. The local customer calls the node and types in a log-on code. The carrier's computer then connects the caller to the information service's computer.

The value-added carrier and the information network are able to handle many callers at the same time because they have special phone equipment called multiplexers, which switch between several phone lines very rapidly. Similarly, they have multi-user computers, which are capable of dealing with several separate input lines so quickly that it seems to each caller that he is the only one connected to the system.

What are DEC VT52 and VT100 emulators?

These are designations for computer terminals marketed by Digital Equipment Corporation (DEC). The VT stands for video terminal. DEC makes a lot of the computers used by information services, and the services' software uses special routines that communicate with DEC terminals. As more customers began to use personal computers to call the networks, software was written that caused the computer to emulate, or behave like, a DEC terminal.

All the terminal programs with which I'm familiar work only with disk drives. Is there a program that will work with a tape drive?

Because of the relatively high speed of modems and the low speed of tape drives, tape is not a practical storage medium for telecomputing. However, there are a few terminal programs floating around that are set up for tape drives. Because they're rare, you will have to do some digging. Your best bet for finding one is to look in the download libraries of local bulletin boards and to check with the programming special interest groups (SIGs) on the networks. (Maybe some of our readers can send in the names of some tape programs and where to find them.)

I am writing my own bulletin board program. How do I make it sense when a caller hangs up?

There are two ways to do this. The simplest is to check for the carrier signal. The carrier is detected by testing bit 4 of location 56577 on the C-64. In Basic, you test this way:

```
CA = PEEK(56577)AND16
```

If CA = 0, then the carrier is still there. When a caller hangs up, the carrier signal is lost, and CA will equal 1. However, the old version of the Commodore 1660 does not have a carrier detect, so that method won't work with that modem.

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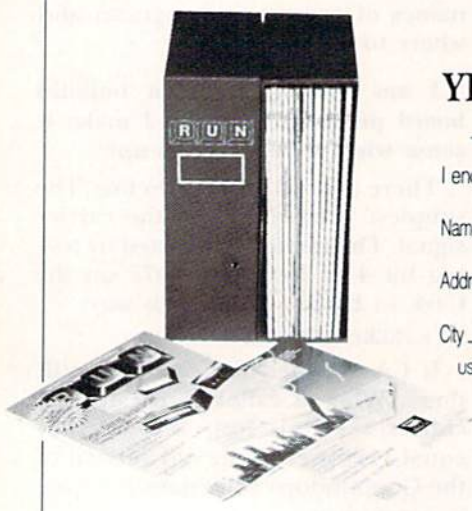

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The second way is to write a subroutine that keeps track of the time between each character the caller sends. If the caller doesn't send any character for, say, ten minutes, then the program could assume the caller has hung up.

After buying my modem and software, I discovered that the information services in my area are long-distance calls. Don't they have 800 numbers I can call, so I don't have to pay long-distance on top of the access charges?

The phone numbers, or nodes, for most national information services are located in metropolitan areas, because that is where most of the traffic is. If you live outside a metropolitan area, there is a way to dial direct to the Big City, by using an FX (foreign exchange) line.

This is a phone line that directly connects you to the central phone exchange in the city. Your local telephone company's business office can give you the details. Such a direct line is expensive, costing around $300 to $500 to install, and maybe $200 per month to operate.

An individual would have to do a lot of calling to justify the expense, but some user's groups have pooled their money and installed an FX line. The phone, computer and modem are located in a central place, and each member has a scheduled time when he or she can use the line. It's an awkward solution, but it beats paying a heart-stopping phone bill every month. R

Do you have any questions about what equipment to buy or how to use it for telecommunications? Having problems getting on-line? Don't know what bulletin boards or national networks to access? Send these, or any other questions or comments you may have about telecommunications, to:

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Telecomputing Workshop answers only those questions that appeal to the majority of our readers. Questions are answered only through this column.

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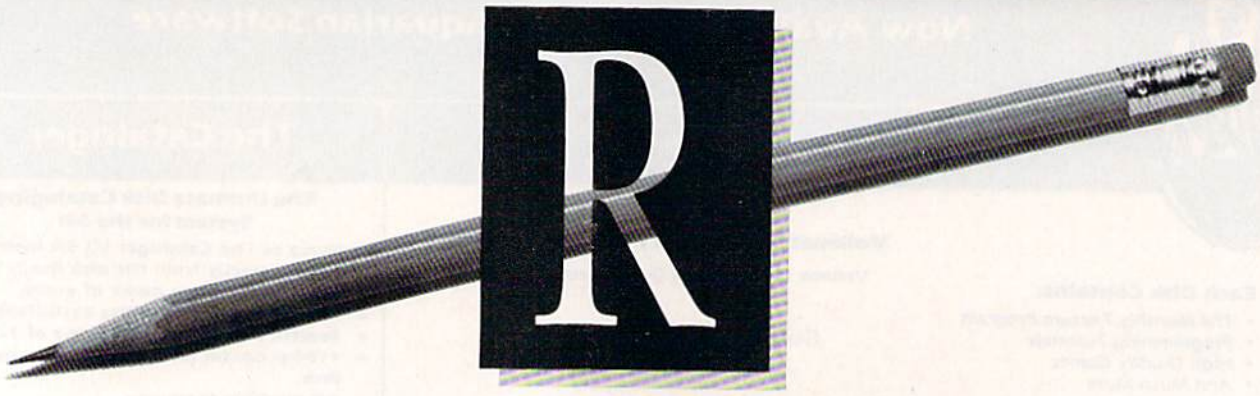

By MARGARET MORABITO

Word processing is one of the most popular and practical applications for educational use. Find out how teachers, parents and students are using it.

Based on the mail I've been receiving, there is great demand for information concerning the use of Commodore computers in education. Many teachers and parents have informed me that they've been using Commodores for educational purposes, but have had to work in a vacuum, relying solely on word of mouth or on their own resources to learn what works and what doesn't. This is a shame, because there are so many people using Commodores successfully in schools.

I'm keeping a database of all contacts made through the Resource Center, and I'll use this file to refer educators and parents to those who can answer their specific questions. With continued efforts, we can make it easier for people to gain reliable information on the use of Commodores in education.

Because of your input, I am now including a new section in the Resource Center: Tips from Teachers. I'm also compiling lists of Commodore software recommended for use by teachers and parents. The first of these lists will appear in next month's column. Now, let's get on with the topic for this month: word processors for teachers and students.

Word Processing

Word processing is mentioned most often by teachers as their primary reason for using a computer. This is probably because word processing can benefit all participants in the educational process: teachers, students, administrators and parents. You can use it in all subject areas; future employers will most likely require it; and you can incorporate it into your day-to-day activities as a practical tool.

Even more important, word processing can be an excellent first step for wary newcomers to computing. It proves that you needn't know how to program to make good use of a computer. Also, it allows you to gradually and easily learn the fundamentals of computer use: creating, saving, loading and printing files. While using a word processor, you can type faster and make mistakes without the inconvenience of having to use "white out" or correcto tape. Word processing leaves you freer to think, and it results in professional-looking printouts.

These factors alone should be enough to spur you on to learn how to use a word processing program. Moreover, they show that this application could be a boon to students who may now shy away from essay writing and typing.

Beyond this, though, there are more practical reasons to use a word processor. It can help you to organize your thoughts, rearrange sentences and phrases, delete unwanted words, make multiple copies with neatly arranged columns and headings, and merge previously created paragraphs to form new documents. The ability to produce high-quality printouts of documents, research papers, letters, quizzes, essays, reports and questionnaires is within the reach of all teachers, administrators and students.

Class Preparation

A word processor can simplify a teacher's classroom preparation, which involves creating tests and other study materials.

For example, Lois Klamar, a learning disabilities teacher in the Cleveland, Ohio, public school system, uses a C-64 with the Magic Desk I cartridge and an NEC 8023 dot-matrix printer to do the bulk of her test preparation. Klamar states, "The C-64 is not only a big time saver for me, but the printouts are so neat and legible that my students can easily read them."

Klamar's tests follow the format of some workbooks and standardized evaluation tests: fill-in-the-blank, multiple choice and true/false questions. By using these formats for testing, her students are one step ahead on standardized tests because of their familiarity with the formats.

Edward Gase, an earth science teacher at the Fairfield, Ohio, Freshman School, also relies heavily on word processing to help with preparation of tests and other classroom materials. Says Gase, "When I tell other teachers how quickly I can put together a final exam at the end of a term, they don't believe me." A teacher's hectic schedule makes time-saving techniques a major concern, and word processing tends to cut down on class preparation, whatever the subject.

Joseph Smith is a health and phys-

ical education teacher in the Allentown, Pennsylvania, school district. Like most teachers, Smith doesn't consider himself a programmer, but he frequently uses his computer for classroom preparation. With his C-64, Cardco Write Now word processor and Cardco LQ/3 letter-quality printer, Smith creates study sheets for his students.

This entails listing important facts and then replacing the key words on the sheet with blanks. He uses the study material when he shows films in his health-instruction classes. The students first read over the sheets; then, while watching the film, they fill in the blanks as the material is encountered.

After the film is over, Smith puts a copy of the study sheet on the overhead projector and reviews each health fact. This follow-up allows the students to correct their answers and any misspellings, thus reinforcing the health concepts several times within one class period.

In the Classroom and at Home

While word processing helps teachers outside the classroom, it is also an effective learning tool for students, both in class and at home. Incidentally, a helpful by-product of word processing is that it provides a good way to learn key placement. While some students may already be proficient typists, those who aren't can benefit from using these programs.

Another advantage is that students don't have to worry as much about making mistakes when doing writing assignments, because it is so easy to delete and fix errors on a word processor. The rewriting done on a computer is far less annoying and much neater than when done with pen and paper!

Following are ten examples of word processor-related classroom exercises that teachers can use. These are just a few of an endless list of possibilities.

1. Creating designs, pictures, graphs and charts.
2. Filling out forms and information sheets.
3. Writing and revising in-class compositions.
4. Creating a class story to which each student contributes a small part.
5. Writing reports: for example, science lab reports.
6. Creating a newspaper in the classroom.
7. Note-taking.
8. Studying outlining techniques and implementing them on the word processor.
9. Studying and practicing research techniques: for example, practicing proper footnote and bibliographic formats.
10. Taking tests.

It's important to realize that many students may have a C-64 or a C-128 at home because of Commodore's low prices. There are also many good-quality yet inexpensive word processing programs from which you can choose.

Built-in spelling checkers also provide a service to students in pointing out misspelled words. Patricia Walters, a sixth- and seventh-grade teacher in Jones County, Mississippi, noticed an improvement in her eight-year-old son's ability to spell since he learned to use the word processor on their new C-128 at home.

Walters noticed that her son deliberately made spelling errors when typing words that he knew. When questioned about this, he said he enjoyed correcting the word when the spelling checker caught it! (This kind of spelling activity could be modified and incorporated into a classroom exercise where the teacher plants misspelled words that students must locate and correct without activating the spelling checker.)

When Looking for a Word Processor

Most word processors perform similar tasks, but the ease of performance and the difficulty of learning how to use the programs differ widely, so you should investigate those factors carefully when looking for a word processor. You should also consider the age and learning level of the students who will be using it. If possible, take the time to try out several programs before you buy.

Here are some questions to ask when purchasing a word processor.

1. How easy or difficult is it to enter, delete, move and rearrange text?
2. What size document can the word processor hold in memory?
3. How easy or difficult is it to save and load documents?
4. Can you save sections of a larger document to disk?
5. Can you merge and link documents that have been previously saved to create a new one?
6. How difficult is it to print out a document?
7. Which printers will the word processor work with?
8. Can you use any of the Commodore's keyboard graphics characters in the word processor? (This is a help in creating graphs or other designs within your documents.)
9. Can this program's files be used with other word processors? (If the program saves its files as sequential files, it can probably share its files with another Commodore word processor. Also, if the program lets you choose between Commodore and standard ASCII formats, this makes compatibility even more likely.)
10. Does the manufacturer provide any other programs, such as a database or a spreadsheet, which could be integrated with the word processor for future activities?
11. How easy is it to control margins, line spacing and special features such as underlining and centering of text?
12. Does the word processor provide a means for visually previewing the document before printing it out? It can be frustrating to painstakingly create a document on the computer screen, only to find that it looks totally different when formatted and printed out.
13. Does the word processor include a spelling checker?

You should consider these questions with reference to the person who will be using the program. If you have a classroom of third graders, you will want to start them off with a word processor that's easy to handle and doesn't necessarily have a ton of features.

If, on the other hand, your students are tenth graders, they're probably ready for a high-powered word processor that will provide them with the opportunity to write lengthy papers using a variety of formatting features.

I would like to hear from those of you who are using word processing

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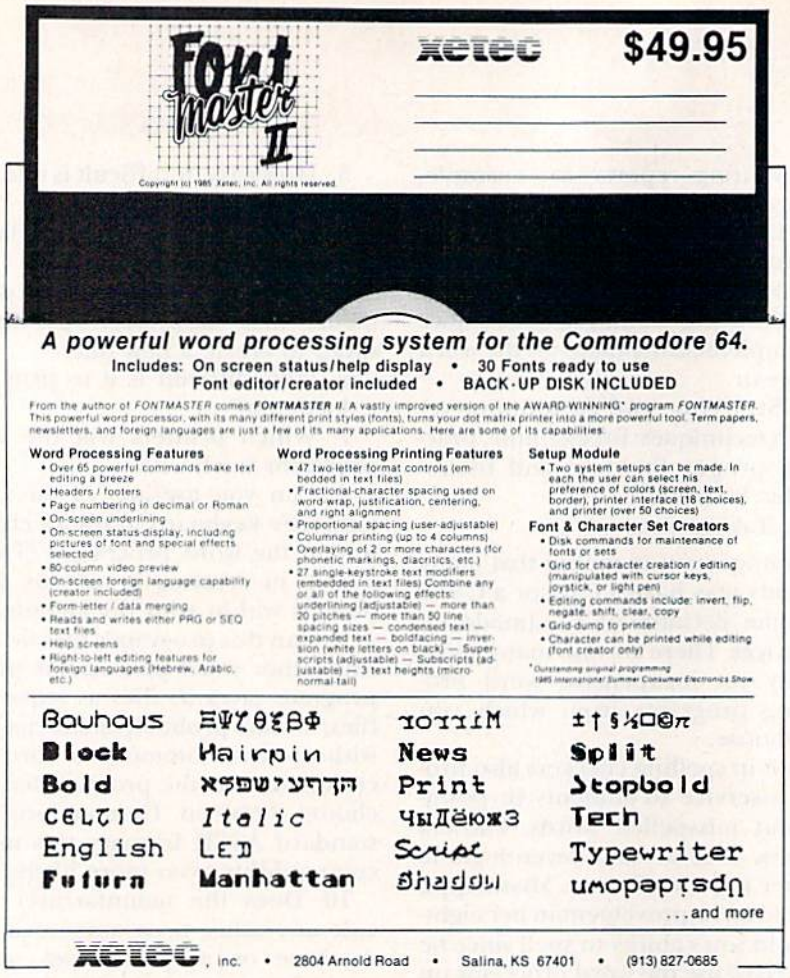
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• Reads and writes either PRG or SEQ text files
• Help screens
• Right-to-left editing features for foreign languages (Hebrew, Arabic, etc.)
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• Proportional spacing (user-adjustable)
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• Overlaying of 2 or more characters (for phonetic markings, diacritics, etc.)
• 27 single-keystroke text modifiers (embedded in text files) Combine any or all of the following effects: underlining (adjustable) — more than 20 pitches — more than 50 line spacing sizes — condensed text — expanded text — boldfacing — inversion (white letters on black) — Superscripts (adjustable) — Subscripts (adjustable) — 3 text heights (micro-normal-tall)
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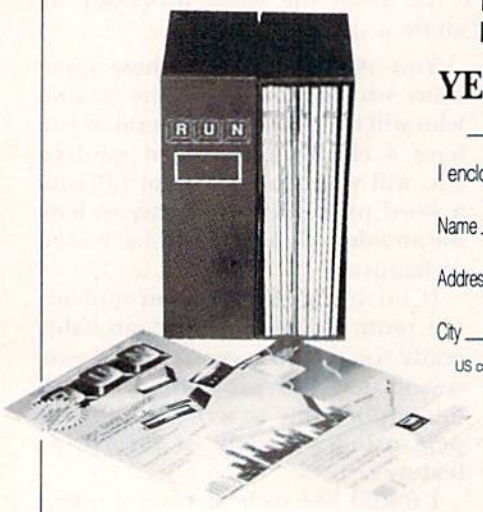

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R The Resource Center

either in or out of the classroom. I am also interested to know which word processor you're using and the ages of the students involved.

Tips from Teachers

Several teachers have told me about an efficient method of making computers more accessible to students. Where there aren't enough computers to go around, you can create a "mobile computer unit." This is a stand on wheels that holds the computer, disk drive and monitor (and possibly a printer). You just roll the computer to where the students are, rather than moving the students. You can also make a large movable table that will hold several computer systems.

Curt Cardine, the principal of the Winchester Elementary School in New Hampshire, uses one mobile unit to move among classrooms. In the morning kindergarten classroom, small groups of students work with the computer. He then rolls the unit into other classrooms of the school as needed. Cardine relies on this unit as his blackboard when the computer is involved in his teaching of fourth- through sixth-grade classes.

Leon Sullivan, a science teacher and computer coordinator at South Hopkins High School in Nortonville, Kentucky, also uses a mobile computer unit. Sullivan built ten mobile tables for use in his advanced math and science classes. R

If you are using Commodore computers for educational purposes (at home or in a school) and would like to share your experiences in the Resource Center, write me a letter detailing the equipment you're using, the subject areas you're involved in, the grade level or age of your students, software that has been effective and any other information you feel like including. Send letters to:

Margaret Morabito
c/o The Resource Center
RUN *Editorial*
80 Pine St.
Peterborough, NH 03458

You can also leave messages in my on-line mail boxes: CompuServe (70616,714), Delphi (MARGM) and QuantumLink (MARGM).

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From p. 10.

For the C-128, you must change the value of C in line 700, using the number listed in line 790. You can change the program's time delay or the Magic character by making appropriate changes to line 700. If you disable your stop key before executing the subroutine, you'll keep others from discovering your trick.

```
699 REM LARSON E. RAPP
7ØØ C=2Ø4:DELAY=5ØØØ:MAGIC$="*":POKEC,Ø
71Ø PRINT"{CRSR DN}READY.":FORJ=1TODELAY:GE
    TA$
72Ø IFA$=""THENNEXT:PRINT"{2 CRSR UPs}";:EN
    D
73Ø POKEC,1:J=DELAY:NEXT
74Ø PRINT" {CRSR UP}{CRSR LF}HANDS OFF, BUD
    DY!"
75Ø FORK=1TO5ØØ:NEXT:RUN7ØØ
76Ø :
77Ø IFA$<>MAGIC$THENPRINT"{2 CRSR UPs}";:EN
    D
78Ø PRINT"PROGRAM CONTINUES HERE":STOP
79Ø REM C=2599 FOR C128, 2Ø4 FOR VIC&C64
```

Larson E. Rapp
Newington, CT

$2D7 Super Bowl Sunday—To get a super pass-completion percentage on this game, throw short passes to your receivers, with three backs also going out for the pass.

Jason Simpkins
Millersburg, PA

$2D8 Logo and Print Shop—You can use Logo to create pictures to work with the popular Print Shop program. After creating your Logo picture on the screen, type:

```
SAVEPICT "filename
```

This saves the picture as a 33-block hi-res file, named filename.PIC1, and as a five-block color file, named filename.PIC2. The first one will load into your Screen Magic when you choose the Get Screen option. After loading it, you can add text if you wish, and you can load or save the altered screen at will.

Thomas M. Trocco
New York, NY

$2D9 Color/no-color monitor—Some software locks the screen into its own colors, which are not necessarily legible or attractive. If you use the Commodore 1701 or 1702 monitor, connected through three wires on the back, there's a solution close at hand. Disconnect the chroma cable, and your display will appear in black, white and various shades of gray. The chroma cable is the one that carries the color signals. It plugs into the red-colored jack.

Michael F. Lehman
Los Angeles, CA

$2DA Too-small video display—Sometimes the top or bottom lines of your screen may not show up on your monitor or television. When that happens, the problem is not in your computer, but in the adjustment of your display. Look on its front or rear panel for two controls marked "vertical height" (or "size") and "vertical linearity." Their names may be somewhat different, or they may be abbreviated in some way. A few inexpensive sets do not have them at all.

When you find the controls, first fill your computer screen with text or keyboard graphics. Next, adjust the two controls so you can see the top and bottom lines, and so the lines in between are not distorted. You'll notice that the height and linearity controls interact somewhat, affecting the picture's size and uniformity. The best method is to adjust one and then the other, going back and forth until your picture is satisfactory.

If the controls are on the back panel, you can position a mirror so you can see the screen while adjusting them.

Bernhardt Sandler
Venice, CA

$2DB Screen Wiper—This routine for the C-64 or VIC wipes the screen clear in two visually interesting ways. It's one of the most elegant and intriguing screen effects we've seen.

The direction of this screen-clearing technique is controlled by the value of C1$ in line 500. If it's a left-arrow symbol, it clears your screen like a theatre curtain pulled from the sides toward the center. If C1$ is an up-arrow symbol, the curtain works from the top and bottom.

As printed, the routine is for the C-64. For the VIC, substitute line 580 for line 500.

```
48Ø REM MAGIC WIPER - J.R.CHARNETSKI
49Ø REM WIPES SCREEN UP/DN OR SIDEWAYS
5ØØ C1$="{LEFT ARROW}" :REM WIPE {UP ARROW}
     OR {LEFT ARROW}
51Ø C1=23:C2=19:C3=24:C4=39:C5=599Ø3:REM C6
    4
52Ø FORJ=ØTOC1:C2$=C2$+CHR$(32)+CHR$(157)+C
    HR$(17):NEXT:C2$=C2$+CHR$(145)
53Ø FORJ=ØTOC2:IFJ=ØTHENPOKE781,C3:SYSC5
54Ø IFC1$="{LEFT ARROW}"THENPRINT"{HOME}";T
    AB(J);C2$:PRINT"{HOME}";TAB(C4-J);C2$
55Ø IFC1$="{UP ARROW}"THENPOKE781,J:SYSC5:P
    OKE781,C3-J:SYSC5
56Ø NEXT:PRINT"{SHFT CLR}";:C2$="":RETURN
57Ø :
58Ø REM LINE 5ØØ FOR VIC: C1=21:C2=11:C3=22
    :C4=21:C5=6ØØ45:REM VIC
```

Joseph R. Charnetski
Dallas, PA

$2DC Rearranging directories—Many computers and disk accessories provide an easy way of loading the first program in your disk directory. It's easy to put any program into the first position, even if another one is there at the moment. The secret is in using the Copy command, which can make a duplicate of any program already on disk.

By skillfully combining the Copy command with other disk commands, you can rearrange your directory at will. For example, if the first program in your directory is Oldfirst, and the one you want to move there is Newfirst, here is the procedure to follow:

1. Use the Rename command to rename Oldfirst, using a temporary name like Temp1.
2. Use the Copy command to copy Temp1 as Oldfirst. This puts a properly named Oldfirst somewhere other than in the first directory position. At this point, the first position is still held by Temp1.
3. Use the Scratch command to eliminate Temp1 from the directory. This vacates the first directory position; it will be filled by the next directory entry added to the disk.
4. Rename Newfirst, using something like Temp2.
5. Copy Temp2 as Newfirst. This puts Newfirst in the first directory position, which was vacated when you scratched Temp1.
6. Scratch Temp2.

Here is the complete syntax for accomplishing the swap:

```
OPEN 15,8,15
PRINT#15,"RENAME0:TEMP1 = OLDFIRST"
PRINT#15,"COPY0:OLDFIRST = TEMP1"
PRINT#15,"SCRATCH0:TEMP1"
PRINT#15,"RENAME0:TEMP2 = NEWFIRST"
PRINT#15,"COPY0:NEWFIRST = TEMP2"
PRINT#15,"SCRATCH0:TEMP2"
CLOSE15
```

Don't forget that PRINT# must be entered as one word, with no embedded spaces.

If you use the DOS wedge or another utility that provides simplified commands, those commands can make your program-swapping even easier. If you plan a lot of swapping, you can write a simple program to do it.

Louis F. Sander
Pittsburgh, PA

**$2DD Disk Name Changer**—This program, which you can use on any Commodore computer, lets you change the name of a disk without reformatting it or losing any files. Make absolutely certain you type it in correctly, since it modifies the directory header block, and program errors could corrupt the disk irreparably. Lines 200–210 are the ones that write to the disk, so you should check them with extraordinary care. Also, SP$ in line 100 should contain exactly 16 spaces.

```
100 PRINT"{SHFT CLR} MAGIC DISKNAME CHANGER
    - LUKE MESTER{CRSR DN}":SP$="{16 SPACE
    S}"
110 PRINT"INSERT DISK TO BE CHANGED,"
120 PRINT"THEN PRESS 'D' TO CONTINUE."
130 GETA$:IFA$<>"D"THEN130
140 OPEN15,8,15,"I0":OPEN2,8,2,"#"
150 PRINT#15,"U1:2,0,18,0"
160 PRINT#15,"B-P:2,144"
170 FORJ=0TO15:GET#2,A$:D$=D$+A$:NEXT
175 PRINT"{CRSR DN}OLD NAME: ";D$:PRINT
180 INPUT"NEW NAME";DN$:IFDN$=""THENEND
190 DN$=LEFT$(DN$+SP$,16)
200 PRINT#15,"B-P:2,144":PRINT#2,DN$;
210 PRINT#15,"U2:2,0,18,0":CLOSE2
220 INPUT#15,A,B$:PRINTB$
230 PRINT#15,"I0":CLOSE15
```

Luke Mester
Colliers, WV

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From p. 38.

Listing 1 continued.

```
55 PRINT"{CRSR DN}{2 CRSR RTs}{CTRL 2}I= IN
   PUT {CTRL 6}NOTES OF YOUR OWN SONG"
                                        :REM*41
6Ø PRINT"{CRSR DN}{2 CRSR RTs}{CTRL 2}A= AD
   D {COMD 3}NOTES TO SONG"             :REM*4Ø
65 PRINT"{CRSR DN}{2 CRSR RTs}{CTRL 2}M= MO
   DIFY {COMD 6}WAVEFORM, A/D, S/R"     :REM*45
7Ø PRINT"{CRSR DN}{2 CRSR RTs}{CTRL 2}S= SO
   UND {COMD 3}CHANGE DURING PLAYBACK"
                                        :REM*214
75 PRINT"{CRSR DN}{2 CRSR RTs}{CTRL 2}E= ER
   ROR CORRECTION {COMD 6}AFTER INPUT"
                                        :REM*63
8Ø PRINT"{CRSR DN}{2 CRSR RTs}{CTRL 2}K= {C
   OMD 6}KEYBOARD SYNTHESIZER{CTRL 2}"
                                        :REM*144
85 PRINT"{CRSR DN}{2 CRSR RTs}{CTRL 2}Q= QU
   IT AND EXIT PROGRAM"                 :REM*241
9Ø GETA$:IFA$=""THEN9Ø                  :REM*2ØØ
95 GOSUB165                             :REM*41
1ØØ IFA$="R"THENGOSUB525:IFVA%=3THEN375:GOT
   O2Ø                                  :REM*78
1Ø5 IFA$="P"THEN155                     :REM*29
11Ø IFA$="C"THEN155                     :REM*156
115 IFA$="I"THEN195                     :REM*195
12Ø IFA$="A"THENZ=2:I=IM:D=IM:GOTO24Ø
                                        :REM*24Ø
125 IFA$="M"THENZ=1:GOSUB195:GOTO2Ø     :REM*71
13Ø IFA$="S"THENGOSUB825:GOTO2Ø         :REM*156
135 IFA$="E"THENZ=3:GOTO645             :REM*139
14Ø IFA$=CHR$(81)THENEND                :REM*23Ø
145 IFA$="K"THENPRINT"{SHFT CLR}":GOTO895
                                        :REM*199
15Ø GOTO2Ø                              :REM*82
155 IFIM<>ØTHEN375                      :REM*117
16Ø GOTO2Ø                              :REM*92
165 IFA$<>"R"ANDA$<>"I"ANDA$<>"P"THENRETURN
                                        :REM*217
17Ø IFA$="P"ANDIM=ØTHENRETURN           :REM*16Ø
175 PRINT"{HOME}{SHFT CLR}{4 CRSR DNs}{2 CR
   SR RTs}{CTRL 9}{COMD 6}HOW MANY VOICES
   WOULD YOU LIKE?{CTRL Ø}{CTRL 2}"
                                        :REM*221
18Ø INPUT"{CRSR DN}{24 SPACEs}(1,2,OR 3)";V
   A%                                   :REM*14Ø
185 IFVA%>3ORVA%<1THENPRINT"{CTRL 9}PLEASE
   REENTER (1 2 OR 3){CTRL Ø}":GOTO175
                                        :REM*229
19Ø VB%=VA%-1:RETURN                    :REM*4
195 FORK=ØTOVB%                         :REM*55
2ØØ PRINT"{SHFT CLR}{3 CRSR DNs}{CRSR RT}PA
   RAMETERS FOR VOICE"K"ARE NOW:W/F-"V(K)"
   , A/D-"D(K)",S/R-"R(K)               :REM*136
2Ø5 PRINT"{2 CRSR DNs}{2 CRSR RTs}{COMD 6}E
   NTER NEW PARAMETERS FOR VOICE #{CTRL 2}
   "K":"                                :REM*55
21Ø INPUT"{CRSR DN}{2 CRSR RTs}{COMD 6}W/F{
   CTRL 2}(17,33,65)";V(K)              :REM*2
215 IFV(K)=65THENINPUT"{CRSR DN}{2 CRSR RTs
   }HI PULSE(Ø-15)";HP(K):INPUT"{CRSR DN}{
   2 CRSR RTs}LO PULSE(Ø-255)";LP(K)
                                        :REM*23
22Ø INPUT"{CRSR DN}{2 CRSR RTs}{COMD 3}A/D{
   CTRL 2}(ØTO255)";D(K)                :REM*118
225 INPUT"{CRSR DN}{2 CRSR RTs}{CTRL 6}S/R{
   CTRL 2}(ØTO255)";R(K)                :REM*11
23Ø IFZ=1THENNEXT:Z=Ø:RETURN            :REM*2Ø
235 NEXT                                :REM*245
24Ø FORK=ØTOVB%:IFZ=2THENI=D:GOTO25Ø
                                        :REM*22Ø
245 I=Ø:D=Ø                             :REM*153
25Ø PRINT"{SHFT CLR}{HOME}{CTRL 9}RECORD ME
   ASURE #{SHFT SPACE}(CLOSEST TO NOTE,ONL
   Y)"                                  :REM*68
255 PRINT"{CTRL 9}BEFORE GOING TO NEXT VOIC
   E OR FOR NOTE{2 SPACEs}ERROR CORRECTION
   {CTRL Ø}"                            :REM*119
26Ø PRINT"{CRSR DN}{2 CRSR RTs}{COMD 6}VOIC
   E #"K"{4 SPACEs}{COMD 3}ENTER NOTES{CTR
   L 2}"                                :REM*135
265 PRINT"{CRSR DN}{2 CRSR RTs}{COMD 6}ENTE
   R Ø,Ø,Ø TO GO TO NEXT VOICE{CTRL 2}"
                                        :REM*28
27Ø IFZ=3THENZ=Ø:GOTO2Ø                 :REM*41
275 GOSUB71Ø                            :REM*3Ø
28Ø IFK=2ANDI=IMTHEND=IM                :REM*237
285 IFNM=ØANDK<>ØANDI<>IMTHENPRINT"{SHFT CL
   R}{2 CRSR DNs}{2 CRSR RTs}{COMD 3}ERROR
    IN ENTRY.{2 SPACEs}{CTRL 2}REDO LAST S
   ERIES"                               :REM*44
29Ø IFNM=ØANDK<>ØANDI<>IMTHENI=D:IM=D:FORT=
   1TO2ØØØ:NEXT:GOTO24Ø                 :REM*121
295 IFNM=ØTHEN365                       :REM*7Ø
3ØØ B=I/16                              :REM*127
3Ø5 WA=V(K):IFNM<ØTHENNM=-NM:WA=1       :REM*236
31Ø DR%=NM/128:OC%=(NM-128*DR%)/16      :REM*2Ø5
315 NT=NM-128*DR%-16*OC%                :REM*1ØØ
32Ø FR=FQ(NT)                           :REM*227
325 IF OC%=7THEN335                     :REM*146
33Ø FORJ=6TOOC%STEP-1:FR=FR/2:NEXT      :REM*19
335 HF%=FR/256:LF%=FR-HF%*256           :REM*56
34Ø IFDR%=1THENH%(K,I)=HF%:L%(K,I)=LF%:C%(K
   ,I)=WA:I=I+1:C=I/16                  :REM*93
345 IFDR%=1THENPRINT"{CRSR UP}{16 CRSR RTs}
   {COMD 6}MEAS.{CTRL 2}"B"{COMD 6}TO"C:GO
   TO27Ø                                :REM*228
35Ø FORJ=1TODR%-1:H%(K,I)=HF%:L%(K,I)=LF%:C
   %(K,I)=WA:I=I+1:NEXT                 :REM*35
355 H%(K,I)=HF%:L%(K,I)=LF%:C%(K,I)=WA-1
                                        :REM*142
36Ø I=I+1:C=I/16:PRINT"{CRSR UP}{16 CRSR RT
   s}{COMD 6}MEAS.{CTRL 2}"B"{COMD 6}TO"C:
   GOTO27Ø                              :REM*195
365 IFK=ØTHENIM=I                       :REM*144
37Ø NEXT:Z=Ø:GOTO2Ø                     :REM*35
375 REM SONG WORDS                      :REM*44
38Ø IFIM<>ØTHEN39Ø                      :REM*55
385 GOTO395                             :REM*124
39Ø PRINT"{SHFT CLR}{1Ø CRSR DNs}{3 CRSR RT
   s}{CTRL 9}{COMD 6} NOW PLAYING {CTRL 2}
    ";NS$                               :REM*249
395 POKES+18,Ø:POKES+4,Ø:POKES+11,Ø:REM*212
4ØØ ONVA%GOTO415,41Ø,4Ø5                :REM*133
4Ø5 POKES+19,D(2):POKES+2Ø,R(2):POKES+16,LP
   (2):POKES+17,HP(2)                   :REM*5Ø
41Ø POKES+12,D(1):POKES+13,R(1):POKES+9,LP(
   1):POKES+1Ø,HP(1)                    :REM*9
415 POKES+5,D(Ø):POKES+6,R(Ø):POKES+2,LP(Ø)
   :POKES+3,HP(Ø)                       :REM*2Ø
42Ø POKES+24,15                         :REM*77
425 A1$=""                              :REM*1Ø8
43Ø FORI=ØTOIM                          :REM*77
435 GETA1$:IFA1$=" "THENPOKES+24,Ø:GOTO2Ø
                                        :REM*152
44Ø ONVA%GOTO455,45Ø,445                :REM*245
445 POKES+14,L%(2,I):POKES+15,H%(2,I):POKES
   +18,C%(2,I)                          :REM*82
45Ø POKES+7,L%(1,I):POKES+8,H%(1,I):POKES+1
   1,C%(1,I)                            :REM*129
455 POKES,L%(Ø,I):POKES+1,H%(Ø,I):POKES+4,C
   %(Ø,I)                               :REM*246
46Ø ONVA%GOTO465,47Ø,475                :REM*45
465 FORR=1TO28:NEXT                     :REM*182
47Ø FORR=1TO28:NEXT                     :REM*187
475 NEXT                                :REM*23Ø
48Ø IFA$="C"THEN155                     :REM*15
485 POKES+24,Ø                          :REM*34
```

→

Listing 1 continued.

```
49Ø PRINT"{SHFT CLR}{3 CRSR DNs}{2 CRSR RTs
    }{COMD 6}DO YOU WISH TO WRITE THE SONG
    TO DISK?{18 SPACEs}{CTRL 2}Y/N "
                                        :REM*191
495 GETA$:IFA$=""THEN495                :REM*152
5ØØ IFA$="Y"THENGOSUB585                :REM*117
5Ø5 GOTO2Ø                              :REM*182
51Ø DATA34334,36376,38539,4Ø83Ø         :REM*87
515 DATA43258,4583Ø,48556,51443         :REM*179
52Ø DATA545Ø2,57743,61176,64814         :REM*62
525 PRINT"{SHFT CLR}":POKE5328Ø,4       :REM*29
53Ø PRINT"{SHFT CLR}{HOME}{CRSR RT}{CTRL 9}
     CHOOSE A SONG AND ENTER THE{COMD 6} NA
    ME ONLY{CTRL 2} {CTRL 1} {CTRL 7}(WITHO
    UT QUOTES){CTRL 2}"                 :REM*86
535 INPUT"{CRSR DN}{2 CRSR RTs}{COMD 6}NAME
     OF SONG{CTRL 2}";NS$               :REM*85
54Ø X$=","                              :REM*48
545 OPEN2,8,2,"ØØ:"+NS$+",S,R":TI$="ØØØØØØ"
                                        :REM*2Ø5
55Ø PRINT"{SHFT CLR}{1Ø CRSR DNs}{3 CRSR RT
    s}{CTRL 9}{COMD 6} LOADING {CTRL 2} ";N
    S$:PRINT"{3 CRSR DNs}{14 CRSR RTs}PLEAS
    E WAIT{CTRL Ø}"                     :REM*194
555 INPUT#2,IM:IFIM=ØTHEN58Ø            :REM*171
56Ø FORK=ØTOVB%:INPUT#2,V(K),D(K),R(K),LP(K
    ),HP(K):NEXT                        :REM*146
565 FORI=1TOIM:FORK=ØTOVB%:INPUT#2,H%(K,I),
    L%(K,I),C%(K,I):NEXT                :REM*17
57Ø PRINT"{HOME}{7 CRSR DNs}{17 CRSR RTs}{C
    TRL 9}{CTRL 8}";TI$:NEXT            :REM*194
575 IFIM<>ØTHENCLOSE2:RETURN            :REM*243
58Ø PRINT"{SHFT CLR}{2 CRSR DNs}{5 CRSR RTs
    }{CTRL 9}{COMD 3}FILE NOT FOUND {CTRL Ø
    }{CTRL 2}":CLOSE2:GOTO535           :REM*244
585 PRINT"{SHFT CLR}":PRINT"{3 CRSR DNs}{4
    CRSR RTs}{COMD 6}INSERT DISK INTO DRIVE
    {CTRL 2}":PRINT"{2 CRSR DNs}{2 CRSR RTs
    }ENTER S TO SAVE"                   :REM*91
59Ø PRINT"{2 CRSR DNs}{2 CRSR RTs}{COMD 3}E
    NTER N IF YOU CHANGE YOUR MIND{CTRL 2}"
                                        :REM*176
595 GETA3$:IFA3$=""THEN595              :REM*77
6ØØ IFA3$="N"THEN2Ø                     :REM*2Ø6
6Ø5 IFA3$="S"THEN615                    :REM*175
61Ø GOTO595                             :REM*11Ø
615 X$=",":INPUT"{SHFT CLR}{2 CRSR DNs}{2 C
    RSR RTs}NAME OF SONG";NS$           :REM*255
62Ø OPEN2,8,2,"ØØ:"+NS$+",S,W           :REM*22
625 PRINT"{CRSR DN}{1Ø CRSR RTs}{CTRL 9}SAV
    ING SONG TO DISK{CTRL Ø}":PRINT#2,IM
                                        :REM*161
63Ø FORK=ØTOVB%:PRINT#2,V(K)X$D(K)X$R(K)X$L
    P(K)X$HP(K):NEXT                    :REM*17Ø
635 FORI=1TOIM:FORK=ØTOVB%:PRINT#2,H%(K,I)X
    $L%(K,I)X$C%(K,I):NEXT:NEXT         :REM*1Ø3
64Ø CLOSE2:RETURN                       :REM*12
645 REM CHANGE NOTE AND OCTAVE          :REM*247
65Ø PRINT"{SHFT CLR}{8 CRSR DNs}{2 CRSR RTs
    }{COMD 6}ENTER VOICE{CTRL 2}(Ø,1,OR 2)"
    ;:INPUTK                            :REM*24Ø
655 IFK>2THENPRINT"{SHFT CLR}{42 SPACEs}{3
    SHFT CLRs}":GOTO65Ø                 :REM*115
66Ø PRINT"{SHFT CLR}{1Ø CRSR DNs}{3 CRSR RT
    s}{COMD 6}ENTER MEASURE # FOR NOTE"
                                        :REM*164
665 PRINT"{3 CRSR RTs}YOU WISH TO{2 SPACEs}
    CHANGE{CTRL 2}"                     :REM*243
67Ø INPUT"{2 CRSR DNs}{3 CRSR RTs}{CTRL 9}{
    COMD 6}ENTER THIS NUMBER{CTRL Ø}{CTRL 2
    }";E1                               :REM*76
675 E2=INT(E1):E=E2:IFE<ØTHENE=Ø        :REM*59
68Ø F=(E1-E2)*16                        :REM*52
685 I=16*E+F                            :REM*73
69Ø PRINT"{SHFT CLR}{1Ø CRSR DNs}{2 CRSR RT
    s}{COMD 6}ENTER NEW NOTE, OCTAVE, AND D
    URATION# {CTRL 2}"                  :REM*38
695 PRINT"{2 CRSR DNs}{4 CRSR RTs}{CTRL 9}{
    CTRL 2}DO NOT {CTRL Ø}{CTRL 2} {COMD 3}
    CHANGE {CTRL 2}THE DURATION #." :REM*61
7ØØ INPUTNP$,NO,ND                      :REM*8
7Ø5 GOSUB715:GOTO3Ø5                    :REM*39
71Ø INPUT"{CRSR RT}{COMD 3}N,{COMD 6}O,{COM
    D 7}D{CTRL 2}";NP$,NO,ND            :REM*42
715 IFNP$="Ø"THENNM=Ø:RETURN            :REM*27
72Ø IFNP$="S"THENNM=-128*ND:RETURN      :REM*4
725 IFNP$="C"THENNP=Ø                   :REM*191
73Ø IFNP$="C#"THENNP=1                  :REM*7Ø
735 IFNP$="D&"THENNP=1                  :REM*81
74Ø IFNP$="D"THENNP=2                   :REM*78
745 IFNP$="D#"THENNP=3                  :REM*87
75Ø IFNP$="E&"THENNP=3                  :REM*1ØØ
755 IFNP$="E"THENNP=4                   :REM*225
76Ø IFNP$="F"THENNP=5                   :REM*38
765 IFNP$="F#"THENNP=6                  :REM*239
77Ø IFNP$="G&"THENNP=6                  :REM*253
775 IFNP$="G"THENNP=7                   :REM*184
78Ø IFNP$="G#"THENNP=8                  :REM*1
785 IFNP$="A&"THENNP=8                  :REM*6
79Ø IFNP$="A"THENNP=9                   :REM*65
795 IFNP$="A#"THENNP=1Ø                 :REM*182
8ØØ IFNP$="B&"THENNP=1Ø                 :REM*193
8Ø5 IFNP$="B"THENNP=11                  :REM*23Ø
81Ø IFNP$="C&"THENNP=11                 :REM*2Ø7
815 NM=128*ND+16*NO+NP                  :REM*16
82Ø RETURN                              :REM*113
825 PRINT"{SHFT CLR}"                   :REM*5Ø
83Ø PRINT"{4 CRSR DNs}{3 CRSR RTs}{COMD 6}P
    RESS F1..F3..F5..F7"                :REM*239
835 PRINT"{CRSR DN}{3 CRSR RTs}FOR UNUSUAL
    HARMONICS{CTRL 2}"                  :REM*22
84Ø GET B$:IFB$=""THEN84Ø               :REM*61
845 POKES+24,15                         :REM*248
85Ø IF B$="{FUNCT 1}"THENPOKES+5,9:POKES+6,
    9Ø:POKES+12,8:POKES+13,9            :REM*247
855 IFB$="{FUNCT 1}"THENPOKES+19,6:POKES+2Ø
    ,69:GOTO425                         :REM*13Ø
86Ø IFB$="{FUNCT 3}"THENPOKES+5,63:POKES+6,
    24Ø:POKES+12,113:POKES+13,53        :REM*23
865 IFB$="{FUNCT 3}"THENPOKES+19,119:POKES+
    2Ø,7:GOTO425                        :REM*18
87Ø IFB$="{FUNCT 5}"THENPOKES+5,36:POKES+6,
    197:POKES+12,53:POKES+13,53:POKES+1Ø,6
                                        :REM*233
875 IFB$="{FUNCT 5}"THENPOKES+19,119:POKES+
    2Ø,7:GOTO425                        :REM*156
88Ø IFB$="{FUNCT 7}"THENPOKES+5,15:POKES+6,
    24Ø:POKES+12,1Ø:POKES+13,167:POKES+1Ø,Ø
                                        :REM*157
885 IFB$="{FUNCT 7}"THENPOKES+19,119:POKES+
    2Ø,24Ø:GOTO425                      :REM*2
89Ø RETURN                              :REM*183
895 CLR:POKE5328Ø,11:PRINT"{SHFT CLR}{CRSR
    DN}{1Ø CRSR RTs}{CTRL 9}KEYBOARD FUNCTI
    ON{CTRL Ø}"                         :REM*238
9ØØ PRINT"{CRSR DN}{CRSR RT}{COMD 6}F1..F3.
    .F5..F7..SELECT OCTAVES{CTRL 2}"
                                        :REM*211
9Ø5 PRINT"{CRSR RT}{COMD 7}F2..F4..F6..SELE
    CT WAVEFORMS.{CTRL 2}"              :REM*112
91Ø PRINT"{CRSR RT}{COMD 5}F8..MAINTAINS A
    NOTE TILL NEXT NOTE"                :REM*119
915 PRINT"{CRSR RT}IS PLAYED{CTRL 2}"
                                        :REM*214
92Ø PRINT"{CRSR DN}{CRSR RT}{COMD 6}PRESSIN
    G SPACEBAR SELECTS SOLO OR"         :REM*189
```

→

Listing 1 continued.

```
925 PRINT"{CRSR RT}POLYPHONIC SOUND."
                                        :REM*19Ø
93Ø PRINT"{CRSR DN}{3 CRSR RTs}{COMD 1}NOTE
    S AND CORRESPONDING KEY CHART{CTRL 2}"
                                        :REM*13
935 PRINT"{CRSR RT}{COMD 6}NOTE..C C# D D#
    E F F# G G# A A# B C{CTRL 2}"   :REM*18
94Ø PRINT "{CRSR RT}KEY...Q 2{2 SPACEs}W 3{
    2 SPACEs}E R 5{2 SPACEs}T 6{2 SPACEs}Y
    7{2 SPACEs}U I "                    :REM*77
945 PRINT"{CRSR DN}{CRSR RT}{COMD 6}NOTES C
    ONT. C# D D# E F F# G G# A{CTRL 2}"
                                        :REM*152
95Ø PRINT"{CRSR RT}KEYS{2 SPACEs}CONT. 9{2
    SPACEs}O Ø{2 SPACEs}P @ -{2 SPACEs}* {L
    B.}{2 SPACEs}{UP ARROW}"        :REM*227
955 PRINT"{2 CRSR DNs}{5 CRSR RTs}{CTRL 9}{
    CTRL 2}PRESS{2 SPACEs}{COMD 6} Z FOR MA
    IN PROGRAM{CTRL Ø}{CTRL 2}"     :REM*238
96Ø S=54272:DIMX(26):DIMY(255):FORI=ØTO28:P
    OKES+I,Ø:NEXT                   :REM*191
965 X1=7Ø4Ø:FORI=1TO26:X(27-I)=X1*5.8+3Ø:X1
    =X1/2{UP ARROW}(1/12):NEXT      :REM*14
97Ø Y$="Q2W3ER5T6Y7UI9OØP@-*{LB.}{UP ARROW}
    "                               :REM*185
975 FORI=1TOLEN(Y$):Y(ASC(MID$(Y$,I)))=I:NE
    XT                              :REM*2Ø4
98Ø AT=Ø:DE=Ø:SU=15:RE=1Ø:SR=SU*16+RE:AD=AT
    *16+DE:WV=16:W=Ø:M=1:OC=4:HB=256
                                        :REM*129
985 Z=Ø                             :REM*224
99Ø FORI=ØTO2:T=I*7:POKES+5+T,AD:POKES+6+T,
    SR                              :REM*165
995 POKES+2+T,4ØØØAND255:POKES+3+T,4ØØØ/256
    :NEXT:POKES+24,15               :REM*252
1ØØØ GETD$:IFD$=""THEN1ØØØ          :REM*57
1ØØ5 FR=Y(ASC(D$)):IFFR=ZTHEN1Ø35   :REM*172
1Ø1Ø FR=X(FR)/M:T=V*7:CR=S+T+4:POKES+5+T,Z:
    POKES+6+T,Z                     :REM*129
1Ø15 POKECR,8:POKECR,Z:POKES+T,FR-HB*INT(FR
    /HB):POKES+1+T,FR/HB            :REM*6
1Ø2Ø POKES+5+T,AD:POKES+6+T,SR:POKECR,WV+1:
    FORI=1TO5Ø*AT:NEXT:POKECR,WV    :REM*181
1Ø25 IFP=1THENV=V+1:IFV=3THENV=Ø    :REM*45
1Ø3Ø GOTO1ØØØ                       :REM*2Ø8
1Ø35 IFD$="{FUNCT 1}"THENM=1:OC=4:GOTO1ØØØ
                                        :REM*221
1Ø4Ø IFD$="{FUNCT 3}"THENM=2:OC=3:GOTO1ØØØ
                                        :REM*114
1Ø45 IFD$="{FUNCT 5}"THENM=4:OC=2:GOTO1ØØØ
                                        :REM*21
1Ø5Ø IFD$="{FUNCT 7}"THENM=8:OC=1:GOTO1ØØØ
                                        :REM*216
1Ø55 IFD$="{FUNCT 2}"THENW=Ø:WV=16:GOTO1ØØØ
                                        :REM*219
1Ø6Ø IFD$="{FUNCT 4}"THENW=1:WV=32:GOTO1ØØØ
                                        :REM*1Ø2
1Ø65 IFD$="{FUNCT 6}"THENW=2:WV=64:GOTO1ØØØ
                                        :REM*9
1Ø7Ø IFD$="{FUNCT 8}"THENW=Ø:WV=17:GOTO1ØØØ
                                        :REM*112
1Ø75 IFD$="Z"THENPOKES+24,Ø:RUN5    :REM*2Ø3
1Ø8Ø IFD$=" "THENP=1-P:GOTO1ØØØ    :REM*244
1Ø85 GOTO1ØØØ                       :REM*7
```


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Checksums for *RUN* 1985 Programs

Last February, in response to many reader inquiries, we began a series of checksum listings for programs published in 1985 before our C-64 checksum program, 64 Perfect Typist, appeared in September. August was covered in February. Below, you will find the July programs' checksum listings.

To use the checksums, you must first load and run 64 Perfect Typist (see How to Type Listings, on page 110); then get out your July issue and begin typing in any program you find in the listings below. Every time you hit the return key, a number from 0 to 255 will appear. If you enter a line correctly, the number following the ":REM" next to the line number will appear.*

If you have already entered one of the programs from July and desire to check it for accuracy, simply enter 64 Perfect Typist, list lines individually or in small groups and position the cursor on the line you want to check. Next, press the return key, and, if you've entered the line correctly, the number that appears below the line will match the number following the ":REM" in the listings.*

You can look forward to seeing more of these listings of 1985 programs in subsequent 1986 issues of RUN.

Datafile Fast Print, by Mike Konshak; July, p. 30.

```
1500  :REM*215
1502  :REM*221
1504   :REM*23
1506  :REM*237
1508  :REM*219
1510  :REM*197
1512   :REM*51
1514   :REM*41
1516  :REM*107
1518   :REM*95
1520  :REM*243
1522  :REM*241
1524   :REM*51
1526  :REM*141
1528  :REM*129
1530    :REM*3
1532   :REM*47
1534   :REM*95
1536   :REM*56
1538  :REM*170
1540   :REM*42
1542   :REM*38
1544  :REM*114
1546  :REM*196
1548  :REM*246
1550  :REM*240
1552  :REM*238
1554  :REM*158
1556  :REM*190
1558  :REM*126
1560  :REM*106
1562  :REM*140
1564  :REM*132
1566  :REM*220
1568   :REM*96
1570  :REM*224
1572  :REM*124
1574   :REM*64
1576  :REM*208
1578  :REM*214
1580  :REM*252
1582  :REM*212
1584  :REM*124
1586   :REM*50
1588  :REM*132
1590  :REM*250
1592  :REM*152
1594   :REM*72
1596   :REM*68
1598  :REM*232
1600  :REM*188
1602  :REM*176
1604  :REM*234
1606   :REM*82
1608   :REM*96
1610  :REM*148
1612  :REM*208
1614  :REM*122
1616   :REM*68
1618  :REM*254
1620   :REM*40
1622  :REM*106
1624  :REM*234
1626  :REM*200
1628   :REM*42
1630   :REM*28
1632   :REM*30
1634   :REM*32
1636  :REM*170
1638  :REM*126
1640  :REM*206
1642  :REM*140
1644   :REM*34
1646   :REM*26
1648  :REM*130
1650  :REM*176
1652  :REM*138
1654  :REM*230
1656    :REM*2
1658  :REM*192
1660  :REM*188
1662   :REM*60
1664   :REM*24
1666  :REM*174
1668  :REM*164
1670  :REM*234
1672   :REM*84
1674  :REM*152
1676  :REM*194
1678  :REM*220
1680  :REM*196
1682  :REM*244
1684  :REM*210
1686   :REM*14
1688   :REM*44
1690  :REM*220
1692   :REM*72
1694  :REM*162
1696  :REM*214
1698  :REM*114
1700   :REM*64
1702  :REM*164
1704   :REM*36
1706  :REM*178
1708  :REM*176
1710  :REM*202
1712   :REM*84
1714    :REM*8
1716  :REM*246
1718   :REM*56
1720   :REM*18
1722  :REM*122
1724  :REM*242
1726  :REM*142
1728  :REM*208
1730   :REM*42
1732  :REM*224
1734  :REM*112
1736  :REM*178
1738  :REM*252
1740   :REM*90
1742  :REM*222
1744   :REM*46
1746   :REM*96
1748   :REM*28
1750    :REM*0
1752   :REM*66
1754  :REM*132
1756  :REM*242
1758  :REM*174
1762  :REM*150
1764   :REM*32
1766   :REM*26
1768   :REM*70
1770   :REM*76
1772   :REM*38
1774  :REM*134
1776   :REM*26
1778   :REM*66
1780  :REM*134
1782  :REM*192
1784   :REM*48
1786  :REM*248
1788  :REM*244
1790  :REM*110
1792   :REM*45
1794  :REM*185
1796   :REM*95
1798  :REM*215
1800  :REM*253
1802  :REM*105
1804  :REM*141
1806  :REM*127
1808   :REM*73
1810  :REM*131
1812  :REM*145
1814  :REM*205
1816  :REM*115
1818  :REM*235
1820   :REM*17
1822  :REM*125
1824  :REM*119
1826   :REM*87
1828   :REM*67
1830  :REM*221
1832   :REM*43
1834  :REM*119
1836   :REM*11
1838  :REM*145
1840   :REM*35
1842   :REM*11
1844  :REM*169
1846   :REM*85
1848  :REM*151
1850  :REM*141
1852  :REM*115
1854  :REM*247
1856  :REM*243
1858  :REM*239
1860  :REM*193
1862   :REM*25
1864  :REM*221
1866   :REM*87
1868  :REM*131
1870  :REM*233
1872  :REM*213
1874   :REM*45
1876   :REM*35
1878    :REM*1
1880   :REM*51
1882   :REM*75
1884  :REM*165
1886  :REM*109
1888  :REM*179
1890  :REM*173
1892   :REM*85
1894   :REM*65
1896  :REM*209
1898   :REM*67
1900  :REM*173
1902  :REM*141
1904  :REM*151
1905   :REM*28
1906  :REM*221
1908   :REM*35
1910   :REM*19
1912   :REM*49
1914  :REM*213
1916   :REM*63
1918  :REM*191
1920    :REM*3
1922   :REM*53
1924  :REM*193
1926  :REM*241
1928   :REM*67
1930  :REM*147
1932  :REM*239
1934  :REM*209
1936  :REM*209
1938  :REM*121
1940  :REM*121
1942   :REM*97
1944  :REM*153
1946  :REM*159
1948  :REM*249
1950  :REM*183
1952   :REM*17
1954  :REM*217
1956  :REM*193
1958   :REM*81
1960  :REM*187
1962  :REM*115
1964   :REM*95
1966   :REM*63
1968  :REM*205
1970  :REM*207
1972  :REM*213
1974  :REM*215
1976  :REM*127
1978   :REM*71
1980   :REM*57
1982  :REM*177
1984  :REM*123
1986  :REM*213
1988   :REM*51
1990   :REM*69
1992   :REM*85
1994  :REM*119
1996  :REM*247
1998   :REM*77
2000  :REM*225
2002   :REM*11
2004  :REM*149
2006   :REM*47
2008  :REM*153
2010  :REM*245
2012  :REM*219
2014   :REM*97
2016  :REM*155
2018  :REM*161
2020   :REM*41
2022    :REM*3
2024   :REM*99
2026   :REM*69
2028   :REM*83
2030   :REM*23
2032  :REM*161
2034  :REM*239
2036  :REM*243
2038  :REM*209
2040   :REM*79
2042   :REM*11
2044  :REM*167
2046  :REM*235
2048  :REM*250
2050  :REM*238
2052  :REM*220
```

Program Painter, by Art Paradis; July, p. 20.

Listing 1. K-PIC-Converter program.

```
100    :REM*230    390    :REM*115    640    :REM*162    890    :REM*199    1140   :REM*134
110     :REM*52    400     :REM*9     650    :REM*242    900    :REM*193    1150    :REM*44
140    :REM*158    410    :REM*141    660    :REM*172    910    :REM*121    1160   :REM*198
150     :REM*22    420    :REM*175    670     :REM*60    920    :REM*157    1170   :REM*126
160    :REM*204    430     :REM*65    680    :REM*196    930    :REM*233    1180    :REM*88
190    :REM*204    440     :REM*29    690    :REM*170    940    :REM*183    1190     :REM*0
200    :REM*190    450     :REM*59    700    :REM*212    950     :REM*15    1200   :REM*154
210    :REM*218    460    :REM*215    710    :REM*176    960    :REM*253    1205   :REM*161
220    :REM*240    470    :REM*109    720    :REM*150    970    :REM*181    1210    :REM*56
230     :REM*76    480    :REM*207    730    :REM*208    980    :REM*121    1220    :REM*76
240    :REM*128    490     :REM*91    740     :REM*10    990    :REM*231    1230    :REM*98
250     :REM*96    500    :REM*103    750    :REM*118   1000     :REM*41    1240    :REM*52
260    :REM*105    510    :REM*231    760    :REM*110   1010    :REM*195    1250    :REM*32
270    :REM*229    520     :REM*0     770     :REM*15   1020    :REM*169    1260   :REM*216
280      :REM*1    530    :REM*122    780     :REM*85   1030     :REM*68    1270    :REM*10
290     :REM*25    540    :REM*236    790    :REM*131   1040    :REM*252    1280   :REM*151
300    :REM*147    550    :REM*222    800     :REM*77   1050     :REM*54    1290    :REM*71
310    :REM*115    560    :REM*184    810     :REM*71   1060     :REM*98    1300    :REM*31
320    :REM*167    570    :REM*162    820     :REM*31   1070     :REM*70    1310   :REM*121
330     :REM*39    580     :REM*60    830    :REM*131   1080    :REM*118    1320   :REM*103
340    :REM*187    590     :REM*90    840     :REM*93   1090     :REM*70
350    :REM*101    600    :REM*220    850    :REM*167   1100    :REM*138
360    :REM*207    610    :REM*160    860    :REM*177   1110     :REM*66
370     :REM*85    620    :REM*212    870     :REM*47   1120      :REM*6
380    :REM*227    630    :REM*110    880     :REM*15   1130    :REM*238
```

Listing 2. K-PIC-Converter example program.

```
100    :REM*100    145    :REM*205   9000    :REM*139   9095    :REM*146   9200    :REM*77
101     :REM*77    146    :REM*122   9010    :REM*205   9100    :REM*129   9205     :REM*0
102    :REM*120    147    :REM*249   9020    :REM*249   9110    :REM*145   9210    :REM*13
103    :REM*231    150     :REM*78   9030     :REM*77   9120    :REM*147   9220   :REM*224
104    :REM*148    160     :REM*60   9040    :REM*173   9130     :REM*85   9225    :REM*53
105     :REM*81    170    :REM*160   9041     :REM*92   9140     :REM*17   9230   :REM*244
106    :REM*114    180    :REM*142   9045    :REM*124   9145    :REM*196   9240    :REM*34
110    :REM*100    190    :REM*160   9050     :REM*13   9150    :REM*175
115    :REM*217    200      :REM*4   9060    :REM*169   9160    :REM*113
120     :REM*24    210    :REM*212   9070    :REM*169   9170    :REM*147
130    :REM*232    219    :REM*195   9080     :REM*43   9180    :REM*101
140     :REM*78    220    :REM*228   9090    :REM*223   9190    :REM*179
```

Watch Your Speed!, by Joseph J. Shaughnessy; July, p. 46; (Listing 2).

```
10     :REM*154    210    :REM*142    410    :REM*213    610    :REM*160    810    :REM*211
20     :REM*196    220    :REM*206    420    :REM*191    620     :REM*46    820    :REM*203
30     :REM*136    230    :REM*240    430    :REM*191    630    :REM*250    830      :REM*3
40     :REM*124    240    :REM*234    440    :REM*243    640    :REM*150    840    :REM*193
50     :REM*226    250    :REM*158    450    :REM*171    650    :REM*230    850    :REM*103
60      :REM*44    260    :REM*145    460    :REM*123    660     :REM*44    860    :REM*207
70      :REM*44    270    :REM*183    470    :REM*205    670    :REM*198    870    :REM*213
80     :REM*224    280    :REM*191    480     :REM*17    680     :REM*34    880     :REM*65
90      :REM*80    290    :REM*231    490     :REM*37    690    :REM*238    890    :REM*143
100     :REM*72    300     :REM*13    500     :REM*37    700    :REM*220    900     :REM*43
110    :REM*222    310    :REM*105    510    :REM*111    710     :REM*72    910     :REM*21
120     :REM*14    320    :REM*123    520     :REM*52    720    :REM*152    920     :REM*61
130    :REM*168    330    :REM*227    530      :REM*2    730    :REM*212    930     :REM*65
140    :REM*204    340     :REM*47    540    :REM*106    740     :REM*96    940    :REM*179
150    :REM*180    350     :REM*61    550    :REM*170    750     :REM*64    950     :REM*13
160    :REM*218    360    :REM*215    560     :REM*14    760    :REM*150    960    :REM*189
170     :REM*82    370     :REM*91    570    :REM*250    770     :REM*83    970     :REM*41
180    :REM*182    380     :REM*17    580     :REM*34    780    :REM*145
190    :REM*200    390    :REM*209    590     :REM*92    790    :REM*153
200     :REM*60    400    :REM*179    600    :REM*158    800    :REM*165
```

A High-Performance Turtle, by Richard Holleran; July, p. 26.

Listing 1. Turtle Graphics program.

```
10     :REM*52    160    :REM*134    320     :REM*61
20    :REM*120    170     :REM*48    330    :REM*163
30    :REM*218    180     :REM*96    339     :REM*82
40    :REM*254    190     :REM*42    340    :REM*213
50    :REM*136    200     :REM*96    350     :REM*97
60    :REM*178    210    :REM*248    360    :REM*195
70     :REM*72    219    :REM*215    370    :REM*131
80      :REM*4    220     :REM*10    380    :REM*241
90    :REM*120    230    :REM*136    390    :REM*189
95    :REM*151    240     :REM*80    400    :REM*183
99     :REM*93    250    :REM*228    410     :REM*45
100    :REM*52    260     :REM*21    420    :REM*129
110    :REM*76    270    :REM*239    430    :REM*235
120   :REM*164    280     :REM*53    440    :REM*221
130    :REM*46    290     :REM*91    450     :REM*53
140   :REM*244    300    :REM*137
150    :REM*16    310    :REM*149
```

Listing 2.
Turtle Graphics
Demonstration program.

```
1      :REM*255    90     :REM*176
10     :REM*126    100    :REM*190
20     :REM*110    110     :REM*24
30     :REM*144    120    :REM*230
40      :REM*66    130    :REM*242
50      :REM*86    140    :REM*136
60     :REM*230    299    :REM*134
70      :REM*10    300    :REM*197
80      :REM*42
```

```
100    :REM*166
110    :REM*152
115    :REM*165
120    :REM*116
130    :REM*180
140    :REM*206
150    :REM*126
160    :REM*136
165    :REM*167
170    :REM*160
200     :REM*12
202    :REM*28
204    :REM*132
210    :REM*152
220     :REM*6
230    :REM*90
235    :REM*185
242    :REM*216
243    :REM*75
244    :REM*184
245    :REM*139
246     :REM*2
247    :REM*185
248    :REM*146
249    :REM*109
250    :REM*200
251    :REM*209
252    :REM*26
254    :REM*160
270    :REM*169
272    :REM*219
273    :REM*154
275    :REM*30
280    :REM*131
281     :REM*2
282    :REM*35
283    :REM*244
284    :REM*115
285    :REM*122
286    :REM*199
288    :REM*127
294     :REM*67
295    :REM*106
300     :REM*21
302    :REM*113
305    :REM*190
310     :REM*67
320    :REM*103
330     :REM*55
340    :REM*183
400    :REM*187
410    :REM*131
420    :REM*141
500     :REM*51
510     :REM*93
520     :REM*72
530    :REM*252
534    :REM*164
535    :REM*239
536    :REM*248
540     :REM*60
542    :REM*138
545    :REM*131
550     :REM*88
560    :REM*114
575    :REM*115
580     :REM*44
610     :REM*62
615    :REM*105
635    :REM*213
638    :REM*212
640    :REM*172
650    :REM*116
900    :REM*171
910     :REM*43
920    :REM*191
930    :REM*141
940     :REM*37
950     :REM*31
955     :REM*68
958     :REM*85
960    :REM*253
970    :REM*181
1000   :REM*109
1010    :REM*27
1020   :REM*129
1030   :REM*242
1040   :REM*164
1050   :REM*152
1060   :REM*224
1070    :REM*72
1075   :REM*217
1080    :REM*52
1090   :REM*128
1100    :REM*56
2000   :REM*103
2010   :REM*101
2020   :REM*123
2030   :REM*221
2040    :REM*21
2041    :REM*64
2042    :REM*17
2043   :REM*176
2044   :REM*157
2045   :REM*242
2046     :REM*9
2047   :REM*214
2048   :REM*150
2049   :REM*209
2050   :REM*250
2051    :REM*13
2052   :REM*222
2053    :REM*13
2054   :REM*242
2120    :REM*56
9000   :REM*205
9010   :REM*185
9020   :REM*225
9030    :REM*81
9031   :REM*104
9032    :REM*35
9033    :REM*48
9034   :REM*197
9035     :REM*4
9036   :REM*117
9037   :REM*196
9038   :REM*155
9039    :REM*96
9040   :REM*253
9041   :REM*250
9042   :REM*131
9043   :REM*222
9044   :REM*125
9045   :REM*204
9046   :REM*163
9047    :REM*72
9048   :REM*153
9049    :REM*42
9050   :REM*101
9051    :REM*92
9052   :REM*133
9053   :REM*212
9054   :REM*171
9063   :REM*142
9064     :REM*7
9065    :REM*58
9066    :REM*91
9067   :REM*178
9068   :REM*149
9069   :REM*228
9070   :REM*187
9071    :REM*32
9072    :REM*49
9073   :REM*184
9074   :REM*181
9075    :REM*30
9076   :REM*181
9077   :REM*182
9078   :REM*201
20000  :REM*146
20005   :REM*55
20010  :REM*156
20015  :REM*101
20020     :REM*4
20030  :REM*220
20040  :REM*208
20050  :REM*136
30000  :REM*227
30002   :REM*83
30004  :REM*231
30005  :REM*146
30009  :REM*210
30010   :REM*17
30020  :REM*133
30030   :REM*27
30040   :REM*95
30050   :REM*91
30060  :REM*149
30070  :REM*249
30080  :REM*161
30090   :REM*83
30100  :REM*229
30110   :REM*17
30140   :REM*75
30150  :REM*159
30160   :REM*31
30170  :REM*137
```


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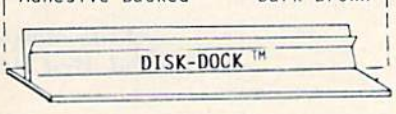

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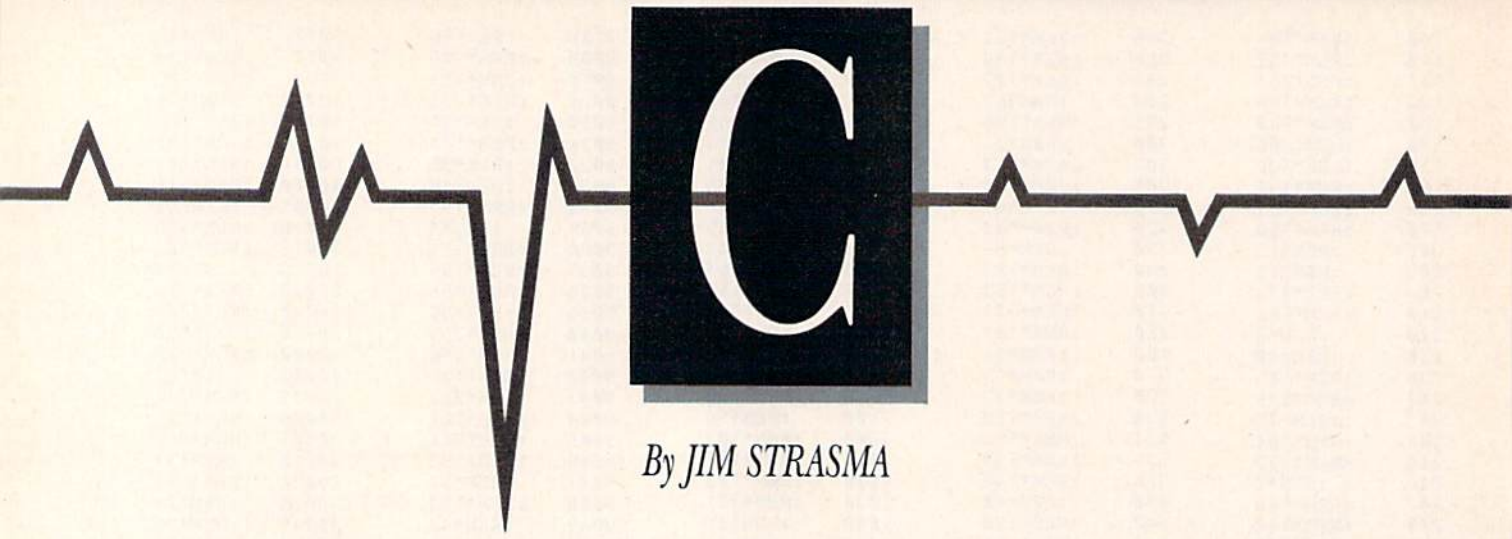

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Queries are answered only through this column, and, due to the volume of mail, only questions likely to appeal to the majority of our readers can be published.

HARDWARE

Q: *I use a C-128 with a Zenith monochrome monitor. I rigged up the system with two cables and a switch so I can use both 40 and 80 columns. I used a three-conductor audio cable so I can have sound, but I can't figure out which pin to hook it to on the RGB connector. The book doesn't list an audio-out pin, but there has to be one.*

Harry Cowles
San Diego, CA

A: Actually, there doesn't have to be any separate audio pin for sound in 80-column mode. The SID chip still works in its usual fashion and through its usual connector, even in 80-column mode. Since there is already an audio-out pin on the 40-column video connector, there's no need for an additional audio pin in the RGB connector, and none is provided.

Q: *I am going to purchase a printer and use it, if possible, at the same time as a modem. However, if I buy a non-Commodore printer, both accessories plug into the parallel port. What can I purchase that will allow me to use both at the same time?*

Sean Hull
Schenectady, NY

A: Unless you have a Plus/4, I would not count on using both a printer and a modem simultaneously, because most Commodore computers (with the exception of the Plus/4) utilize one I/O chip for both modem and printer operations. This chip can't perform both functions at once.

One cure is to use them alternately, storing text to be printed in memory until you can pause your modem conversation long enough to print what is in memory. Many terminal programs allow this.

As for plugging non-Commodore printers into the parallel port, it isn't necessary and I don't recommend it. The normal way to control most printers from current Commodore computers is via the serial bus, and special interfaces to make this possible are widely available at reasonable cost. The problem is that the parallel port on most Commodore computers is not a Centronics parallel printer port, such as you find on most printers; rather, it is an experimenter's port, not intended to be compatible with other parallel devices. It is, however, almost compatible with serial RS-232 devices, and makes a good modem port.

Q: *I have a C-64 with a C2N Datassette. On the end of the cassette plug is a thin wire, trailing away from the main plug. Where does this wire go?*

Thomas Lovie
Address not given

A: That wire hooks up to a nut and bolt on the back of Commodore's 8000-series computers. When using the C2N with a 64, there are only two safe things to do with the wire. One is to wrap it around the main cord and cover it completely with electrical tape, in case you ever have a computer that can use it. The other is to cut it off entirely. Be sure to do one or the other; if you leave it hanging around loose, it could damage your computer's electrical components.

Q: *Since parallel data transfer is faster than serial, why do you think Commodore has stuck with serial data transfer for its disk drives?*

Keith Marshall
Trinidad, West Indies

A: Commodore has used parallel data transfer for years on its larger systems, specifically IEEE-488. It is an effective but expensive way to control one or more disk drives and printers. With the introduction of the VIC, Commodore used a serial bus instead, to cut costs. (Not many VIC owners would have happily paid $50 extra for each drive or printer cable.) At that point Commodore did not anticipate selling disk drives to more than ten percent of its VIC owners. Commodore stayed with the serial cable on the 64 and 128 to ensure compatibility with existing equipment.

PROGRAMMING

Q: POKE 808,225 disables the run/stop and restore keys and the List command. What is the Poke that reactivates these commands?

Larry S. Harmon
El Centro, CA

A: To be sure of the correct value on your computer, simply type:

```
PRINT PEEK (808)
```

when you turn on your computer, and press the return key. The number that appears on the next line is the one to type after POKE 808 to restore normal function to that location. On my C-128 in 64 mode, the number is 237, so you would type POKE 808,237.

Q: I have a C-64 and 1541 and am heavily into programming. I've noticed that when I save a ten-line program, it uses 40–78 blocks on my disk. I don't see how.

Robert Schiffman
Hampton Bays, NY

A: Most likely, your program altered the start-of-Basic or end-of-Basic pointer during a run. That's the problem. You saved your program to disk after running it. I suggest you *never* save a program to disk after running it.

Instead, load the old version (if any) from disk, make your changes, save the new version and only *then* type RUN. In the case of your ten-line program, you need only load it, clear the screen, list all lines on the screen at once, type NEW, move the cursor back to the top of the screen and press the return key until all ten lines have been reentered. To be sure, list again. Then save the program before trying to run it. I'm sure it will then take only a few blocks on disk.

Q: I have a C-64 and want to know how to copy the 8K Basic interpreter to another portion of memory and have Basic go to the "new" interpreter.

Tim Watkins
Pawtucket, RI

A: There are two steps involved. First, you copy the interpreter into the desired new address, using the Transfer (T) command of most extended machine language monitors. Next, you must convert absolute address references from one memory range to another. This is done with the New Locator (N) command of most such monitors. Be especially careful of absolute addresses hidden within tables and immediate addresses. With the help of a good disassembly of the Basic ROMs, such as *What's Really Inside the Commodore 64* (from Schnedler Systems), all this can and has been done. However, I suggest you start with something much smaller than an 8K interpreter. As a good first effort, you could move DOS 5.1 from its current home near the end of the $C000 block of memory to its beginning.

REPAIRS

Q: Lately, my 1541 won't read or write on track 1; it just clicks against the end stop. A disk-aligning program from CSM Software has an option to check alignment where it reads all the tracks, and it says my drive is in alignment. Please help.

Marty Westra
Sioux Falls, SD

A: Since the alignment program claims that all is well, how sure are you that track 1 can't be read from or written to? Here's a short program to test writing to track 1:

```
10 OPEN 15,8,15
20 OPEN 4,8,4,"#"
30 PRINT#4,"TRACK-ONE"
40 PRINT#15,"U2";4;0;1;1
50 CLOSE 4
60 CLOSE 15
70 END
```

Here's another to read back what you've written:

```
10 OPEN 15,8,15
20 OPEN 5,8,5,"#"
30 PRINT#15,"U1";5;0;1;1
40 FOR X = 1 TO 9
50 : GET#5,A$
60 : PRINT A$;
70 NEXT X
80 CLOSE 5
90 CLOSE 15
99 END
```

If you really do have a problem using track 1, you will need to adjust the end stop or, better yet, replace it with a Quiet Drive spring from Cardinal Software. This is not the same as aligning the drive, although alignment can affect the end stop and setting the end stop can affect alignment. Be sure both are correct before relying on the drive.

Q: While using my C-64, I am occasionally unable to recall a letter that is listed in the disk directory, even though documents before and after it can be recalled. Is this a fault of the 1541 or is it a bad spot on the disk? Is there any way to recall this missing letter?

G. L. Curtice
Rockport, TX

A: If there is an asterisk (*) next to the filetype in a directory listing, that file is called a "splat" file, because it was not properly closed when first written. The disk will not let you load such files normally, because it has no way of knowing where the file ends.

A skilled user can rescue at least part of a splat file by opening it with a filetype of ",S,M" and copying it to another file. The new file can be closed when no more valid data can be retrieved from the splat file. Once rescue attempts are completed, such files should immediately be deleted from the disk with the disk Validate or Collect command. On your C-64, type:

```
OPEN 15,8,15,"V0"
```

Do *not* omit the zero!

On a C-128 or Plus/4, type:

```
COLLECT D0
```

This is essential; erasing the file any other way creates a serious risk of losing other valuable data on the disk.

The most common cause of a splat file is running out of room on the disk while saving a file. If the disk formatted properly when you first bought it and has not been abused, the odds are that it is still in good shape physically. Similarly, if you can still load other letters, your 1541 is probably in good shape as well.

Q: While I was using a copy program, my screen went berserk. Now when I turn on

the computer, the entire screen fills with exclamation marks. Anything I type is accepted, but I cannot understand what I type. For example, I type "R" and the system shows "S" on the screen. Would you please tell me how to get rid of the exclamation points?

Wilson Fern
Chicago, IL

A: This is a simple, though annoying, problem—bit 0 of your video RAM is defective and stuck in the "one" position. This causes all characters with even values in the collating sequence of your character set to display as the next higher character in the set. That's why spaces become exclamation marks and R becomes S.

To make sure, type an A. It should appear as an A, because it has an odd value in the collating sequence and thus *needs* bit 0 set.

The cure is equally simple—replace the video RAM chip. On most Commodore computers, it is a widely available 2114 static RAM. If it is socketed on your machine, replacement is a matter of unplugging the old chip and plugging in the new one, making sure both point in the same direction and that no stray electricity, static or otherwise, gets near the computer during the process. If the old chip is soldered in, have a skilled technician remove it and add a socket for the replacement.

SOFTWARE

Q: Is the CP/M in the Commodore 128 more or less like WordStar?

Eleanor Patterson
Garden Valley, CA

A: Let me answer with another question—Is Commodore DOS like Easy Script? In both cases, we're comparing apples with oranges. CP/M and Commodore DOS are disk operating systems. Both are fundamental to the correct operation of the C-128 in their respective modes. However, neither one is itself a word processor like WordStar or Easy Script.

We tend to think of WordStar in conjunction with CP/M because it works on the C-128 when we are in CP/M mode. (It was written for the Z-80 microprocessor CP/M uses.) Commodore has developed a version of WordStar for the 128, but you may be disappointed by it.

Despite its famous name and widespread use, I consider WordStar to be inferior to several other word processors already available for the C-128. The main reason to choose WordStar is if you already use it on another computer and don't want to learn a new program, or if you need a specialized feature only WordStar offers. R

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RUN Magazine, Nov. 1984

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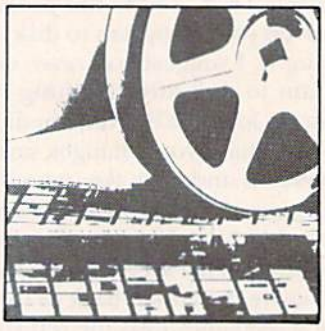

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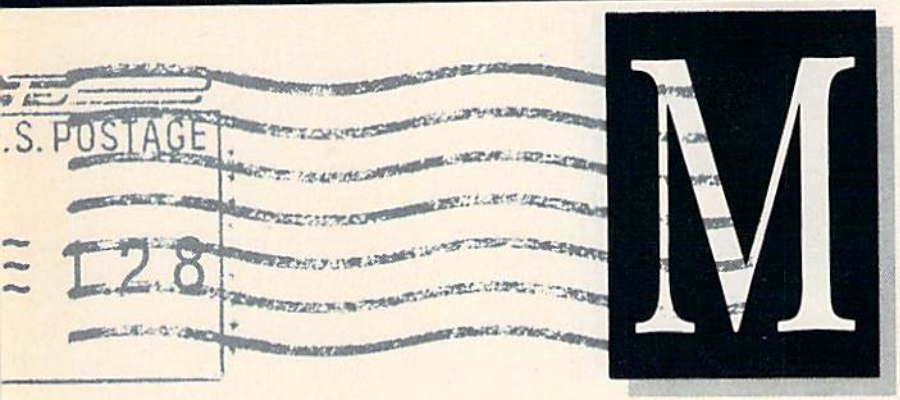


Autoboot Maker Enhancement

I have an enhancement for the C-128 program, Autoboot Maker, which is included in your article, "Disk Commands on the C-128," December 1985. The following line will allow you to rewrite your autoboot disks:

```
205 CHAR1,7,6," REWRITE AUTO BOOT?
    (Y/N)",1
```

Chuck Geiger
Address not given

A Smart Idea

I have read with great pleasure Margaret Morabito's education column, "The Resource Center," which made its debut in your January 1986 issue.

I am a teacher at the Fairfield Freshman School in Fairfield, Ohio. I have been advocating the use of Commodore computers over the more expensive Apples and IBMs for several years without much luck. Your column may help. I'm sure you won't mind my giving a copy of it to the administrators and computer labs of this school district.

Edward A. Gase
Hamilton, OH

Looking for a Date?

William Driscoll's Magic trick in the *RUN* 1986 Special Issue (p. 148) fails to take into consideration the following.

Normally, a year that is evenly divisible by 4 (for example, 1984) is a leap year. However, there are at least two exceptions to this rule. First, if the year is evenly divisible by 100 (1800, 1900, for instance), then it is *not* a leap year. Second, if the year is evenly divisible by 1000 (year 2000, for example), then it *is* a leap year.

Mr. Driscoll's clever program does not consider this problem of exceptions. Therefore, it will make an error every time it is required to cross over one of the exception-to-the-rule dates. For example, the time from March 1, 1899 to March 1, 1900 is *not* 366 days; it is 365.

Lyle Milton Baltrusch, PhD
Paul J. Lynch
Wyoming, DE

A Misleading Ad?

Several points made in the advertisement by Skyles Electric Works on P. 121 of December's issue are incorrect, or at least couched in terms that make the ad very misleading.

First, they claim that their drive is the largest hard disk available for the C-64 and C-128. They *do* suffix that claim with the phrase "at a price under $800," but the reader is left with the impression that it is the largest drive available at any price. In truth, Fiscal Information, Inc., and Computer Specialties, Inc., both manufacture hard drive systems of greater capacity. Both companies offer ten-megabyte systems, and Fiscal also sells 20-megabyte drives for Commodore computers.

The Skyles ad incorrectly claims that its drive is the fastest (at 12 times the speed of the 1541). The Fiscal system has always been 43 times as fast as the 1541, and that system has recently been improved to operate nearly 60 times as fast as the CBM floppy. That is nearly five times faster than the Skyles drive!

Finally, they claim that on a per-character basis (I will translate to "cost-per-megabyte"), their drive is the least expensive. In the table below are the figures comparing the three companies' systems (based on recent advertising prices).

Lloyd E. Sponenburgh
Director of Hardware Development
Fiscal Information, Inc.
Daytona Beach, FL

A Commodore Jamboree

The Commodore Association of the Southeast, Inc. (C.A.S.E.), will hold its annual meeting and jamboree 1986 at the Opry Land Hotel in Nashville, Tennessee, on April 26–27, 1986.

C.A.S.E. is a consortium of the user's groups of the southeastern United States. The general public is welcome to attend this two-day jamboree. For further information, contact Commodore Association of the Southeast, Inc., PO Box 110386, Nashville, TN 37222.

Bob Smith, President
C.A.S.E.

	Skyles	C.S.I.	Fiscal	
Capacity	3.7MB	10MB	10MB	20MB
Speed (×1541)	12×	<12×	43×	43×
Cost-per-MB	$215.95	$159.50	$159.50	$99.75
(basis)	($799/3.7)	($1595/10)	($1595/10)	($1995/20)

Compiled by HAROLD R. BJORNSEN

Programming and Design Toolkit

Programmers' Basic Toolkit (Epyx, Inc., 1043 Kiel Court, Sunnyvale, CA 94089), a Basic programming aid for the C-64, includes over 100 new Basic commands to let you add to your application programs assembly language operations that can enhance your game designs, computer animation, business graphics and other applications.

Special commands allow you to develop professional-quality application programs for home or business-use graphics. For those of you with artistic talent, the toolkit makes it possible to create high-quality graphics like those in many commercial games.

Other commands enable you to incorporate computer joystick functions into your programs and provide printing utilities. Available on disk for under $45.

Check Reader Service number 400.

WillWriter Will Write Your Will Right

WillWriter, a new book/software package from self-help legal publisher Nolo Press (950 Parker St., Berkeley, CA 94710), helps you write simple, legally binding personal wills.

The 170-page book explains the legal concepts and conditions involved in drawing up a will and provides information on aspects of estate planning, including trusts and probate avoidance methods.

The software leads you step by step through each section of the will, with on-screen help, prompts and fill-in-the-blank questions to lead you through the procedure. Also, you may change and update your will. Available on a single noncopy-protected disk for the C-64 for $39.95.

Check Reader Service number 407.

Printer Stand

Amaray (14935 NE 95th St., Redmond, WA 98052) introduces its printer stand that accommodates any 80-character-width printer.

The smoke-colored stand is lightweight, sturdy and requires no assembly. It features a center slot to accommodate bottom-feed printers and has space for up to 3½ inches of continuous-form paper. Available for $19.95.

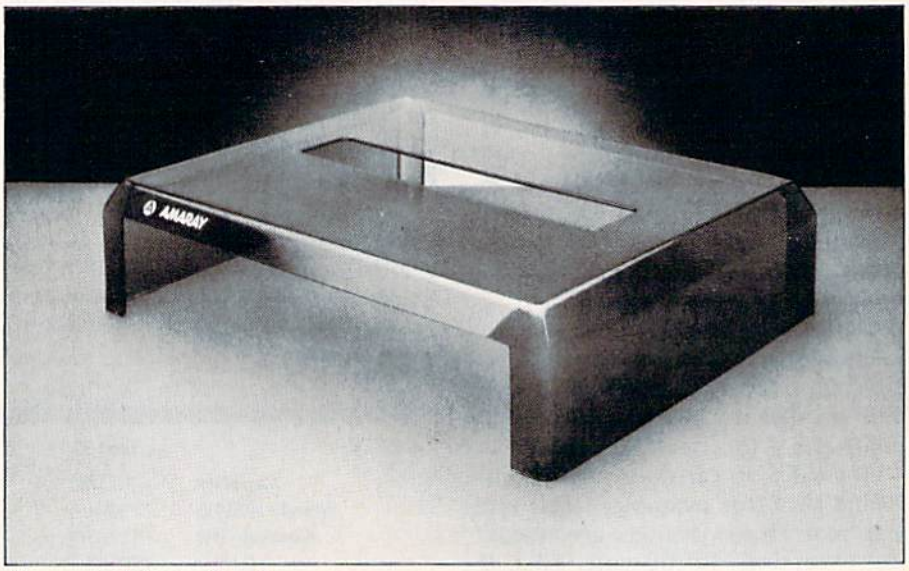
Check Reader Service number 404.

On-line Typesetting Service

Compuprint (715 Washington St., Ayden, NC 28513) is providing a 24-hour typesetting service via modem to anyone requiring professional-quality phototypeset printing. Over 300 fonts in all sizes are available.

Typeset copy is mailed to you or a specified location the day after receiving your order. A one-time fee of $26 allows you to subscribe to the service. There is no charge for on-line use of the computer and no per-character charges. Cost includes $3.10 per photoset page or $1 per laserset page processing charge. If you don't have a modem, a disk may be mailed to the company and typeset for $4.10 per page and return postage.

Check Reader Service number 408.



Amaray's Printer Stand.

Improve Your Aim

Type-Snyper, a new computer game that teaches you to type, has been released by Tymac Controls (127 Main St., Franklin, NJ 07416).

The game/tutorial features an attack helicopter that drops bundles of words and letters that you must intercept by typing them before they can destroy the city.

Sixteen different exercises are included, with lessons ranging from proper finger placement to increasing speed and accuracy. Type-Snyper automatically adjusts exercises to emphasize areas needing extra practice and also displays typing speed achieved. Available on disk or cassette for the C-64 for $39.95.

Check Reader Service number 410.

Tiger's Tales, from Sunburst Communications.

Volks Mini, from Anchor Automation.

Volks Mini

The Volks Mini, a new modem from Anchor Automation (6913 Valjean Ave., Van Nuys, CA 91406), provides 300 or 1200 bps data transmission capabilities for your Commodore computer or terminal with a standard serial communications port and a telephone, without need for an ac outlet, power supply or additional interconnection cables.

The manual dial, manual or auto-answer modem plugs into the user's port on the back of your computer and connects with a phone jack to the telephone.

The Volks Mini modem retails for $199 and includes a two-year, end-user warranty.

Check Reader Service number 406.

"Sam! They want you dead!"

You've just picked up the phone, and those words are ringing in your ear. As Sam Harlow, small-time private eye of the 1930s, this is the assignment of your life: to prevent your own murder.

Thus begins the new computer novel, Borrowed Time, from Activision (2350 Bayshore Frontage Road, Mountain View, CA 94043), wherein you have less than one day to track down and cross-examine possible suspects.

As the player, you control only the movements of Sam Harlow; the other characters' actions are independently controlled. Available on disk for the C-64 at $29.95.

Check Reader Service number 405.

Multipass Disassembler

The Sourcerer (Chessoft Ltd., 723 Barton St., Mt. Vernon, IL 62864) is a multipass disassembler that converts 6500 series machine language (object code) into assembly language (source code).

The assembly language produced can be assembled with the Commodore assembler or loaded for editing with the Commodore editor. Any specified range of code within a program can be disassembled, and long programs automatically produce linked files for easy editing.

The Sourcerer is available on disk for the C-64 for $29.95.

Check Reader Service number 403.

May the Forth Be with You

The Forth-83 Handy Reference Card is now available free from the Forth Interest Group (PO Box 8231, San Jose, CA 95155). It functions as a pocket programming aid, listing the required commands of the most recent Forth-83 standard.

Commands are grouped by function for easy reference and use. They include stack manipulation, comparison, arithmetic, memory, strings, numeric conversion, control structures, terminal input/output, mass storage input/output, program beginning and termination, dictionary addresses, compiler and interpreter words, vocabularies and defining words.

Check Reader Service number 402.

Grab a Tiger by the Tale

In Tiger's Tales, an educational program from Sunburst Communications (39 Washington Ave., Pleasantville, NY 10570), youngsters from kindergarten to second grade join Tiger the cat and his friends in five interactive stories. Each story ends with a colorful, animated sequence.

The program's aim is to strengthen basic reading and problem-solving skills while encouraging children to read just for fun. The program, including backup disk, is available for the C-64 for $59.

Check Reader Service number 411.

How to Type in C-64 and C-128 Listings from RUN

To simplify your typing of *RUN*'s C-64 and C-128 program listings, we include checksum numbers. These numbers follow a REM statement at the end of each line (e.g., :REM*123). These checksum numbers necessitate your using RUN's Perfect Typist programs, listed below. Use 64 Perfect Typist for C-64 programs and 128 Perfect Typist for 128 Mode programs on the C-128.

Type in 64 Perfect Typist (Listing 1) or 128 Perfect Typist (Listing 2) and save it to either tape or disk before running. When you want to type in a 64- or a 128-mode program, first load and run the appropriate Perfect Typist listing. Two SYS numbers will be displayed on your screen. Jot these down and keep them handy. They are the SYS numbers that you type in for deactivating and reactivating the checksum program.

After Perfect Typist has been loaded and run, start typing in the program listing from *RUN* as you normally do. The only difference is that now, after you press the return key to log in each line, a 1-, 2- or 3-digit number will appear below the line on the left margin. This is the checksum number, ranging from 0 to 255.

If this number matches the checksum number printed in the listing after the :REM*, then you know you have typed that line correctly. Then you type the next program line right over the previous line's checksum value. If the checksum numbers do not agree, analyze your line on screen for any typographic errors or omissions. Make the needed changes and press the return key again to log in those changes. A new checksum number will appear in place of the old one. Compare this to the magazine's number and then proceed to the next line.

When you've finished typing in your program, disable the Perfect Typist by typing in the appropriate SYS number for either 64 or 128 mode, and press the return key. Now you can save your program as usual, to disk or tape. (Before you attempt to run your new program, turn your computer off and back on to completely clear out the Perfect Typist program.)

You may save an incomplete program any time and continue it later. You will have to reload and run the Perfect Typist program, then load the incompleted program that you were working on, list it, and continue where you left off.

The 128 Perfect Typist will work in either 40 or 80 columns. Also, it lets you use the C-128's automatic line-numbering. If Auto is on, the checksum will be printed below the line you just entered, and the C-128 will place the next line number below the checksum.

All listings in *RUN* have been translated so that the graphics and control characters are designated as understandable key combinations. When you see instructions inside curly brackets, such as {SHIFT L}, you should hold down the shift key and press the L key. What you see on your screen will look quite different from what is designated inside the brackets. Another example is {22 SPACEs}, which instructs you to press the space bar 22 times.

Listing 1. *64 Perfect Typist program.*

```
1 REM 64 PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17Ø13
7 REM
1Ø POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
2Ø PG=PEEK(56):ML=PG*256+6Ø
3Ø FORX=ML TO ML+154:READD:T=T+D:POKEX,D:NE
   XT
4Ø IFT<>16251 THEN PRINT"ERROR IN DATA...":
   END
6Ø POKEML+4,PG:POKE ML+1Ø,PG:POKE ML+16,PG
7Ø POKE ML+2Ø,PG:POKE ML+32,PG:POKE ML+38,P
   G
8Ø POKE ML+141,PG
89 PRINT"{SHFT CLR}{CRSR RT}**************
   **********************"
9Ø SYS ML:PRINT "{CRSR RT}** 64 PERFECT TYP
   IST IS NOW ACTIVE{2 SPACEs}**"
1ØØ PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACEs}
    SYS"ML+3Ø"=OFF **"
1Ø1 PRINT"{CRSR RT}**********************
    **************":NEW
11Ø DATA 173,ØØ5,ØØ3,2Ø1,ØØ3,2Ø8,ØØ1,Ø96
12Ø DATA 141,1Ø5,ØØ3,173,ØØ4,ØØ3,141,1Ø4
13Ø DATA ØØ3,162,1Ø3,16Ø,ØØ3,142,ØØ4,ØØ3
14Ø DATA 14Ø,ØØ5,ØØ3,Ø96,234,234,173,1Ø4
15Ø DATA ØØ3,141,ØØ4,ØØ3,173,1Ø5,ØØ3,141
16Ø DATA ØØ5,ØØ3,Ø96,Ø32,124,165,132,Ø11
17Ø DATA 162,ØØØ,142,24Ø,ØØ3,142,241,ØØ3
18Ø DATA 189,ØØØ,ØØ2,24Ø,Ø51,2Ø1,Ø32,2Ø8
19Ø DATA ØØ4,164,212,24Ø,Ø4Ø,2Ø1,Ø34,2Ø8
2ØØ DATA ØØ8,Ø72,165,212,Ø73,ØØ1,133,212
21Ø DATA 1Ø4,Ø72,238,241,ØØ3,173,241,ØØ3
22Ø DATA Ø41,ØØ7,168,1Ø4,Ø24,Ø72,Ø24,1Ø4
23Ø DATA Ø16,ØØ1,Ø56,Ø42,136,Ø16,246,1Ø9
24Ø DATA 24Ø,ØØ3,141,24Ø,ØØ3,232,2Ø8,2ØØ
25Ø DATA 173,24Ø,ØØ3,Ø24,1Ø1,Ø2Ø,Ø24,1Ø1
26Ø DATA Ø21,141,24Ø,ØØ3,169,Ø42,Ø32,21Ø
27Ø DATA 255,169,ØØØ,174,24Ø,ØØ3,Ø32,2Ø5
28Ø DATA 189,162,ØØ3,189,211,ØØ3,Ø32,21Ø
29Ø DATA 255,2Ø2,Ø16,247,164,Ø11,Ø96,145
3ØØ DATA Ø13,Ø32,Ø32
```

Listing 2. *128 Perfect Typist program.*

```
1 REM 4Ø/8Ø COL 128 MODE PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17Ø13
7 REM
1Ø FORX=512ØTO5379:READD:T=T+D:POKEX,D:NEXT
2Ø IFT<>28312 THENPRINT"{2 CRSR DNs}ERROR I
   N DATA...":END
25 A$="":IFPEEK(215)=128THENA$="{2Ø SPACEs}
   "
3Ø PRINT"{SHFT CLR}"A$"{CRSR RT}**********
   **************************"
4Ø PRINTA$"{CRSR RT}** 128 PERFECT TYPIST I
   S NOW ACTIVE **"
5Ø PRINTA$"{CRSR RT}**{2 SPACEs}SYS 512Ø=ON
   {7 SPACEs}SYS 515Ø=OFF{2 SPACEs}**"
6Ø PRINTA$"{CRSR RT}**********************
   ***************":SYS512Ø:NEW
512Ø DATA 173,ØØ5,ØØ3,2Ø1,Ø2Ø,2Ø8,ØØ1,Ø96,1
     41,Ø45
513Ø DATA Ø2Ø,173,ØØ4,ØØ3,141,Ø44,Ø2Ø,162,Ø
     43,16Ø
514Ø DATA Ø2Ø,142,ØØ4,ØØ3,14Ø,ØØ5,ØØ3,Ø96,2
     34,234
515Ø DATA 173,Ø44,Ø2Ø,141,ØØ4,ØØ3,173,Ø45,Ø
     2Ø,141
516Ø DATA ØØ5,ØØ3,Ø96,Ø32,Ø13,Ø67,14Ø,255,Ø
     19,162
517Ø DATA ØØØ,142,252,Ø19,142,253,Ø19,142,2
     54,Ø19
518Ø DATA 189,ØØØ,ØØ2,2Ø1,Ø32,24Ø,ØØ8,2Ø1,Ø
     48,144
519Ø DATA ØØ7,2Ø1,Ø58,176,ØØ3,232,2Ø8,238,1
     89,ØØØ
52ØØ DATA ØØ2,24Ø,Ø54,2Ø1,Ø32,2Ø8,ØØ5,172,2
     54,Ø19
521Ø DATA 24Ø,Ø42,2Ø1,Ø34,2Ø8,Ø1Ø,Ø72,173,2
     54,Ø19
522Ø DATA Ø73,ØØ1,141,254,Ø19,1Ø4,Ø72,238,2
     53,Ø19
523Ø DATA 173,253,Ø19,Ø41,ØØ7,168,1Ø4,Ø24,Ø
     72,Ø24
524Ø DATA 1Ø4,Ø16,ØØ1,Ø56,Ø42,136,Ø16,246,1
     Ø9,252
525Ø DATA Ø19,141,252,Ø19,232,2Ø8,197,173,2
     52,Ø19
526Ø DATA Ø24,1Ø1,Ø22,Ø24,1Ø1,Ø23,141,252,Ø
     19,169
527Ø DATA Ø42,Ø32,241,Ø2Ø,Ø32,188,Ø2Ø,16Ø,Ø
     Ø2,185
```

```
528Ø DATA 185,Ø2Ø,Ø32,241,Ø2Ø,136,Ø16,247,1
     65,116
529Ø DATA 2Ø8,ØØ9,165,117,2Ø8,ØØ5,169,145,Ø
     32,241
53ØØ DATA Ø2Ø,172,255,Ø19,Ø96,Ø13,Ø32,Ø32,1
     62,ØØØ
531Ø DATA 173,252,Ø19,232,Ø56,233,1ØØ,176,2
     5Ø,1Ø5
532Ø DATA 1ØØ,2Ø2,24Ø,ØØ3,Ø32,232,Ø2Ø,2Ø1,Ø
     1Ø,176
533Ø DATA ØØ5,2Ø5,252,Ø19,24Ø,Ø15,162,ØØØ,2
     32,Ø56
534Ø DATA 233,Ø1Ø,Ø16,25Ø,Ø24,1Ø5,Ø1Ø,2Ø2,Ø
     32,232
535Ø DATA Ø2Ø,17Ø,Ø72,138,ØØ9,Ø48,Ø32,241,Ø
     2Ø,1Ø4
536Ø DATA Ø96,17Ø,173,ØØØ,255,Ø72,169,ØØØ,1
     41,ØØØ
537Ø DATA 255,138,Ø32,21Ø,255,1Ø4,141,ØØØ,2
     55,Ø96
```

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May

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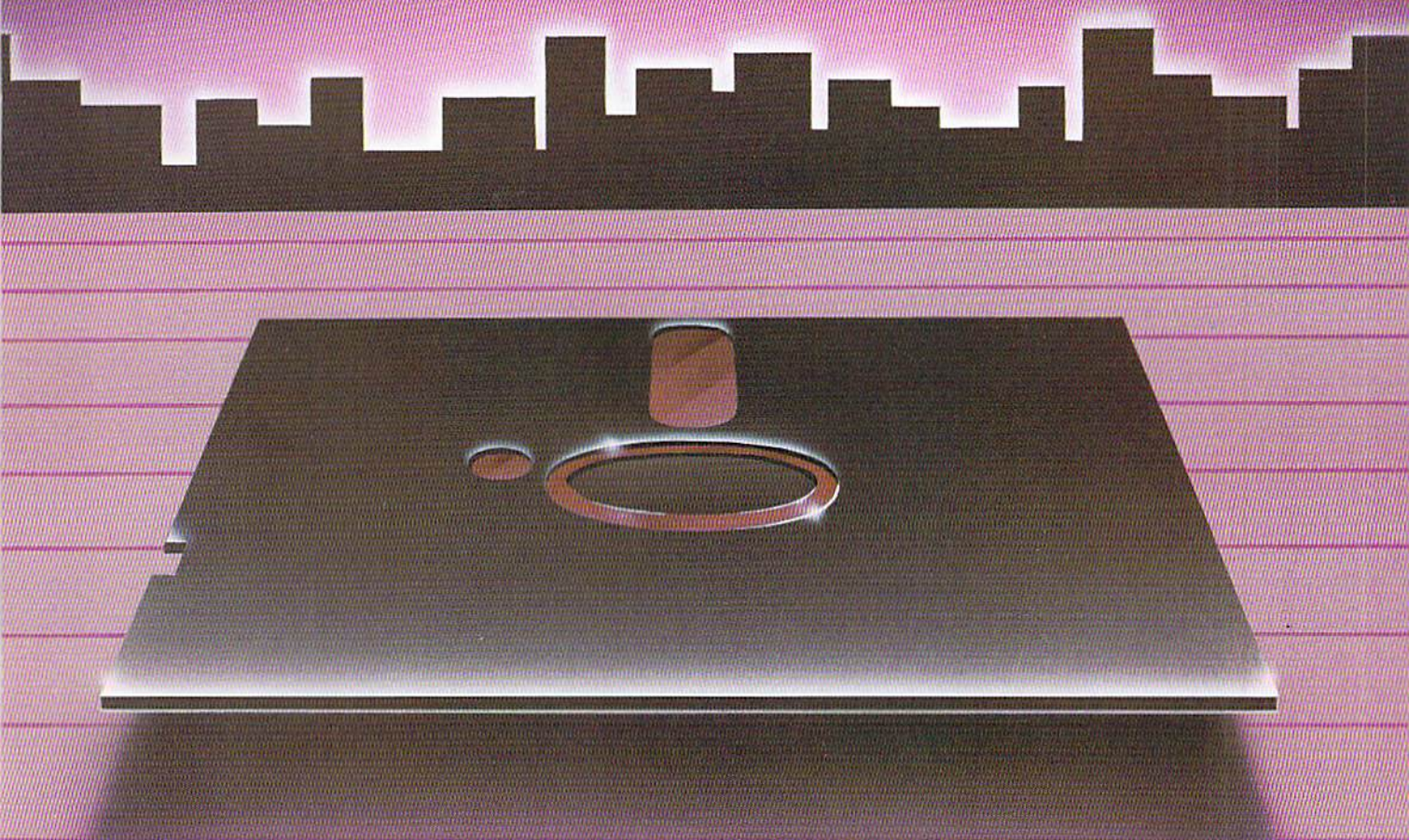

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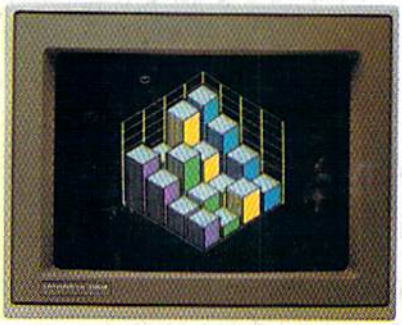

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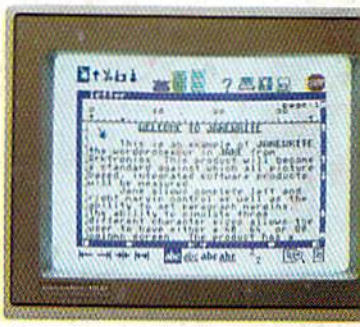

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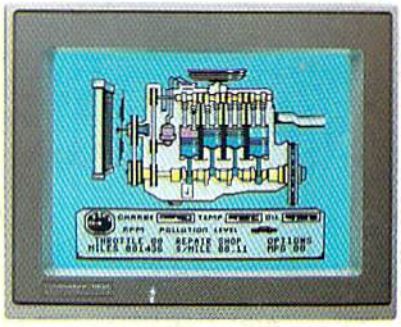

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